New Nouveau
Brunswick

FOREST MANAGEMENT MANUAL

FOR

CROWN LANDS

JUNE 1992

Natural Resources & Energy

Ressources naturelles et Énergie

FOREST MANAGEMENT MANUAL

FOR

CROWN LANDS

DEPARTMENT OF NATURAL RESOURCES AND ENERGY

PROVINCE OF NEW BRUNSWICK

Hon. Alan Graham
Minister

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Deputy Minister

June 1992

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- SECTION A -

THE FOREST RESOURCE MANAGEMENT PLAN

The Forest Management Plan will describe the objectives for which Crown lands and the resources of Crown lands will be used by the Licensee and Sublicensee. It will describe general land management procedures and, in particular, the manner by which the Licensee will manage the Crown lands under license with respect to silviculture, timber harvesting, and fish and wildlife habitat. The Management Plan will establish wood supply volumes over an 80-year horizon and will provide mapped harvest schedules for a 25-35 year period (i.e., through the anticipated period of wood supply shortage).

Revised Management Plans are required every five years, each for a subsequent 25-35 year period and will cover activities on the entire license. Licensees must use the most up to date resource information available at the time of Management Plan development. Every 5 years, prior to the revision of the Management Plan, any changes in Crown land resource objectives will be conveyed to the Licensees by Department of Natural Resources and Energy (DNR). As well, specific details of minimum acceptable Management Plan requirements will be defined by DNR in consultation with the Licensees.

Activities outlined in the first period of the Management Plan will be implemented by the Licensee. These activities will be carried out according to the specifications of the Operating Plan section of the Forest Management Manual (FMM). Modifications to the Management Plan, may be made at the Operating Plan level if new information identifies areas that are experiencing rapid volume loss or require special treatment because of site-specific wildlife habitat.

- SECTION B -

THE OPERATING PLAN

The Operating Plan describes all the proposed activities on the License. It constitutes the implementation document for the Management Plan. The Plan shall be prepared annually, on a one year time horizon, by the Licensee in consultation with the Sublicensees. This plan shall be signed by an R.P.F., submitted by the Woodlands Manager for review and approval by the RRM. The Sublicensee is responsible for the timely provision of planning information to the Licensee for the preparation of the Operating Plan. Before harvesting operations begin on areas designated to supply Sublicensee(s) requirements, Letters of Agreement signed by the Licensee and each Sublicensee covering the Sublicensee's part of the Operating Plan must be submitted to the RRM. Letters of Agreement between a Licensee and Sublicensee must specify that price, volumes, harvesting locations and/or delivery arrangements have been agreed upon.

The "operating year" is defined as April 1 of one year to March 31 of the succeeding year.

GENERAL

The Licensee has full responsibility for the planning, preparation and implementation of all operations in the Operating Plan. The Licensee has full responsibility for ensuring that the annual Operating Plan does, in fact, implement the Management Plan for the License, as approved by the Minister, and the continuation of the Forest Management Argreement (FMA) at each five year renewal is dependent on performance in this respect. In meeting these responsibilities, the Licensee is responsible for full consultation with the Sublicensees.

Suppression of insect and disease outbreaks and herbicide application are the responsibility of the DNR on Crown Lands, after consultation with Licensees and Sublicensees.

The Licensee has full responsibility to ensure the most efficient use of the available quality material (eg. sawlogs). The Licensee will make available, annually to each Sublicensee, the appropriate volumes as outlined in the FMA. The Sublicensee and Licensee have a responsibility to ensure the best possible levels of utilization.

For timber species or products generated in the normal harvesting operation on the license as outlined in the approved Operating Plan and not allocated to Licensee or Sublicensee mills, the RRM may authorize the Licensee to use the volume in his own plant or to supply Sublicensees with a volume of timber over and above their Crown allocation.

The Licensee will be expected to adjust the unaccessed harvest areas blocked in the first five years of the Management Plan on the basis of new management information [high damage (budworm, maturity), blowdown, site-specific wildlife habitat].

Unless otherwise directed by the RRM, the Licensee shall be responsible for the disposal of all species not required by the Sublicensee or Licensee from all harvesting operations as approved in the Operating Plan. Where the Sublicensee carried out his own operation, he is responsible for all products generated from the trees harvested, felled or pushed over in the course of producing the products he requires, except for products which are part of the Licensee's allocation which belong to the Licensee.

DNR is responsible to review and accept the Operating Plan based on the Forest Management Manual, its Appendices and approved Departmental policies. DNR will use the annual Operating Plan as part of the evaluation of the performance of the Licensee.

The Advisory Board will investigate disputes with respect to the Operating Plan and will advise the Minister on action to resolve disputes. A dispute between a Licensee and a Sublicensee will not hold up the commencement of operations, subject to the discretion of the RRM. Where the RRM cannot resolve a dispute between a Licensee and a Sublicensee or when DNR is in dispute, the RRM will advise the Minister of Natural Resources and Energy who may request the Advisory Board to investigate and advise him as laid down in the Timber Regulation under the Crown Lands and Forests Act.

All Licensees and Sublicensees will be expected to contract or offer to contract, each year, for their full share of marketing board wood. The "full share" will be that volume used by the Department in determining each Crown allocation.

The acquisition of the nonindustrial freehold wood by Licensees and Sublicensees as part of their annual wood supply will be accomplished through negotiations with the various wood producer marketing boards. The Licensee negotiations must be successfully completed (i.e. an agreement between both parties) or referred to arbitration before an Operating Plan is approved by the RRM. In the event that a Sublicensee does not reach agreement with a Marketing Board, the portion of the Operating Plan addressing the wood supply to that particular Sublicensee will not be approved by DNR until negotiations are successfully completed or referred to arbitration.

MAP REPORTING

A 1:125 000 scale map shall be used to illustrate the general location of activities on the License. The detail of the Operating Plan will be presented on 1:12 500 cover type maps. The Licensee is requested to put as much information as possible on one set of maps.

CONTENTS OF THE OPERATING PLAN

The Operating Plan will contain the following sections and be submitted in the specified format:

1. Roads
2. Harvest
3. Silviculture
4. Fish and Wildlife Habitat
5. Recreation
6. Required Letters of Agreement
7. DNR Amendments

1. Roads:

The Licensee's Operating Plan will contain map sheets at a scale of 1:125 000 showing existing and proposed forest road, and maps at a scale of 1:12 500 showing proposed forest and logging roads and all maintenance projects.

To facilitate planning the Licensee must provide the location of all roads to be constructed in the operating year accessing harvest blocks proposed for the next year as well as the location of the harvest block. Locations of such projects are to be on maps at a scale of 1:12 500. Requirements for forest road and logging road construction are outlined in **Appendix 10**.

The Licensee shall submit, to the RRM at the time the Operating Plan is submitted, a list of all Watercourse Alteration Applications required in accordance with the **Clean Water Act** and a list of all known watercourse crossings with appropriate culvert sizes and locations. The Licensee shall also submit expected sources of gravel required for road construction or maintenance. The Licensee is responsible for acquiring all Quarry Permits before work commences.

2. Harvest:

Within the approved Management Plan Licensees have the flexibility of scheduling all blocks approved for period one. Licensees, however, will be expected to schedule the harvest of approved blocks so as to minimize volume loss.

For any proposed harvest block not originally scheduled within the first five year period in the Management Plan, the Licensee must provide justification acceptable to the RRM for rescheduling into the first five year period.

The Licensee shall complete the harvesting related forms in **Appendices 11** and **12**. When completing these Appendices primary forest products shall be referred to as listed in **Appendix 9**. This information will correspond to actual locations of harvest blocks outlined on maps at a scale of 1:12 500.

The Licensee shall submit a **Notice of Commencement** on forms specified by DNR for each harvesting block to the RRM no less than five (5) days prior to commencement of harvesting operations unless other acceptable arrangements are made with the RRM. Work Permits, as specified under the **Forest Fires Act,** must be obtained before commencement of an operation.

Licensees are required to ensure supervision of all their harvesting operations on the License to ensure that the conditions applying to each harvesting operation are followed. This includes compliance with utilization standards, area control, protection of special areas, treatment of site-specific wildlife habitat and environmental protection. Requirements for harvesting timber on Crown Lands are outlined in **Appendix 13**. DNR shall be responsible for cut inspections on Sublicense harvest blocks, ensuring that;

i) approved utilization standards are being observed,

ii) harvesting operations are conducted within the Licensee flagged block as approved in the Operating Plan,

iii) work permits have been acquired and that required fire equipment is available on the operation,

iv) watercourse crossings and other environmental or fish and wildlife related activities are conducted as required, and

v) specific harvest prescriptions and requirements of **Appendix 13** are followed.

The Licensee is required to submit a final harvest inspection report no later than two weeks after completion of the harvest block for all blocks they are supervising. No such notice will be required for Sublicensee operated blocks supervised by DNR. Regional DNR staff will monitor Licensee harvesting operations and assess compliance of environmental requirements designed to prevent irreparable damage to environmentally sensitive areas such as watercourse buffer strips and deer wintering areas.

The Licensee must submit their and Sublicensees product utilization standards with the Operating Plan Submission and may revise these with the approval of the RRM prior to operating in a block. These shall be submitted by species and product.

The Licensee is responsible for monitoring and controlling wasteful cutting practices on all Licensee harvesting operations. Merchantable waste shall not exceed an average of 3.0 m^3/ha/or 3% (whichever is lowest) of the volume harvested by the operator for all species outlined for removal in the Operating Plan. The Licensee, upon a request by the RRM, shall submit a waste analysis report for any Licensee harvesting block or portion thereof. These reports will not normally be requested until the cutting phase of the harvesting operation has been completed. Waste analysis must be completed by the method specified in **Appendix 14** on forms supplied by DNR.

The Licensee shall report scale information for all timber harvested from the License to the District Ranger at the end of each month on DNR Scale Report Forms. The Licensee shall submit this information in accordance with conditions specified in the **Scalers Act** and specific Scaling Instructions provided by DNR.

The Licensee shall be responsible for the payment of all royalty charges for timber harvested on the License. However, penalties incurred by Sublicenses for harvest related violations shall be the administrative responsibility of DNR.

3. Silviculture:

Treatment standards for basic silviculture are outlined in **Appendix 1**. Criteria for the selection of planting areas are outlined in **Appendix 2**. Plantations will be assessed for reimbursement in the year of establishment as specified in **Appendix 3** and in the fifth year following planting to evaluate plantation performance as specified in **Appendix 5**. Areas fill planted will be assessed in the year of establishment as specified in **Appendix 4**; and in the fifth year as specified in **Appendix 5**. Natural regenerating cutovers will be addressed in the fifth year following harvest as specified in **Appendix 5**. Criteria for selection of stands to be precommercially thinned are outlined in **Appendix 6**. Precommercial thinning will be assessed for reimbursement as specified in **Appendix 7.**

The Licensee shall identify the silviculture operations to be carried out in the format specified in **Appendix 15**. The following additional information will be reported in **Appendix 15** for silvicultural treatments proposed within site-specific wildlife habitats; a) the habitat type or DWA number in which the treatment is proposed and a description of the objectives and details of the proposed treatment. Specifications for nursery stock are listed in **Appendix 17**. Proposed stand tending (herbicide treatment) areas must be identified on 1:12 500 maps; plantations must include species and date planted. To facilitate the planning and budgetary process, herbicide treatment blocks and support data should be submitted (by the Licensee) to the RRM by August 15. Between August 15 and October 31 DNR Regional staff will evaluate (on the ground) and review these proposals in order to have a firm proposal in the Operating Plan by November 30. No other proposals will be added to the plan in the year of treatment after June 15 unless approved by the RRM. Criteria for herbicide area selection are listed in **Appendix 21**.

4. Fish and Wildlife Habitat:

The Licensee will identify site-specific fish and wildlife habitat management activities. Requirements for harvesting deer wintering areas are outlined in **Appendix 16**. Planned site-specific wildlife habitat management activities shall be reported in the following appendices. The description of proposed timber harvest operations shall be completed in **Appendix 11**. The description or proposed silvicultural treatments shall be completed in **Appendix 15**. All proposed watercourse buffer strips shall be reported in **Appendix 11**. Locations and widths of proposed buffer strips will be referenced on the same NBFDS 1:12 500 maps as the associated harvest blocks.

5. Recreation:

Identify recreational management operations planned for year one and relate them to maps at a scale of 1:12 500.

6. Required Letters of Agreement:

The Licensee shall submit Letters of Agreement by April 1 for each Sublicensee. A Letter of Agreement must be submitted before the Sublicensee will be allowed to operate or receive Crown timber.

7. DNR Amendments:

Proposed DNR amendments to the Operating Plan will be forwarded to the Licensees as they occur for the following activities:

a) tendered permits
b) untendered permits
c) reserves
d) Natural Resource Development Program
e) silviculture
f) boundary line maintenance
g) access road construction.

OPERATING PLAN APPROVAL AND MAINTENANCE

1. One copy of the Operating Plan will be submitted to the RRM for acceptance not less than 4 months prior to the start of the operating year (April 1 - March 31). Except for **Appendix 12**, Letters of Agreement from Sublicensees, portions of silviculture operations (planting and thinning) and herbicide areas, all sections of the Operating Plan must be submitted on or before November 30, prior to the year of the Operating Plan. All blocks to be harvested by the Sublicensee must be identified on 1:12 500 forest cover type maps. A copy of these maps along with a completed copy of **Appendix 11** must be given to the Sublicensee at the same time as the Operating Plan is delivered to the RRM. **Appendix 12** and Letters of Agreement with Sublicensees must be submitted on or before April 1 of the year of the Operating Plan. A portion (as determined by the RRM) of planting and thinning operations must be submitted prior to September 30 to facilitate approved areas for early commencement the following spring. Herbicide areas must be submitted by August 15 as specified on Page 11. Once approved three copies of the Operating Plan will be required by the RRM, one of which will be returned to the Licensee.

2. Within 90 days of receipt of the Operating Plan, the RRM will notify the Licensee of necessary alterations, if any.

3. All necessary alterations of the Operating Plan will be completed no later than two(2) weeks prior to the start of the operating year.

4. An approved Operating Plan may be subject to amendment within the operating year. Amendments proposed by the Licensee must be submitted in writing to the RRM for approval; and if required, shall be attached to the Operating Plan.

- SECTION C -
THE ANNUAL REPORT

This section provides the format for updating the data base on an annual basis to reflect the changes and assessments which occur each year (April 1 - March 31). Licensees are responsible for providing an Annual Report (2 copies) for all activities outlined below for the Operating Year (April 1 - March 31) by July 31 of each year in a format specified by DNR. This report shall be signed by an R.P.F. and submitted by the Woodlands Manager. The Annual Report will be used by DNR to evaluate performance of Licensees in complying with the approved Management and Operating Plans. The information required is described in the following sections:

1. **Roads**
2. **Harvest**
3. **Silviculture**
4. **Fish and Wildlife Habitat**
5. **Recreation**
6. **Sublicensees**
7. **Licensee Freehold Harvest**
8. **DNR Activities**

The Licensee must also submit an Annual Report, in a format mutually agreeable to DNR and the Licensees, for all lands which they own or control.

1. **Roads:**

Summarize forest and logging road construction and forest road maintenance activities during the past year and identify locations of forest road construction on 1:12 500 aerial photographs and on 1:12 500 cover type maps. Standards for the type and quality of aerial photographs to be supplied to DNR are outlined in **Appendix 22.**

2. **Harvest:**

Report the actual harvest operations during the past year by completing **Appendix 11.** The Licensee shall also provide a License Summary of the actual harvest on a form similar to **Appendix 12.** The actual harvest blocks will be shown on maps and vertical aerial cut photographs (2 copies) of the harvested areas at a scale of 1:12 500. Standards for the type and quality of cut photographs to be supplied to DNR are outlined in **Appendix 19.**

3. Silviculture:

3.1 Year of Treatment

Report the actual silvicultural activities, including Environmental Trust Fund Activities, which were accepted for reimbursement in the past operating year as specified in **Appendix 20**. The location of planting and thinning activities will be shown on maps at a scale of 1:12 500. In the event that Licensees carried out herbicide application, the following additional information is required in the Annual Report:

(a) method of application;

(b) application rate (active ingredient in kg/ha or litres/ha and total amount of spray mixture delivered);

(c) chemical applied;

(d) date treated.

3.2 Five Year Assessments

Licensees shall provide survey data obtained from the Fifth Year Silviculture Surveys as follows:

a) On the performance of plantations, plantation cleaning and precommercial thinning (basic silviculture) as specified in **Appendices 5 and 7**.

b) On the performance of cutovers not designated as basic (BP, BT) or Licensee silviculture (LS) as specified in **Appendix 5**.

c) On the performance of plantations established under the Environmental Trust Fund as specified in **Appendix 5**.

4. Fish and Wildlife Habitat:

The Licensee will report all site-specific wildlife habitat management activities during the past year in the following appendices. The description of actual harvesting operations shall be reported in **Appendix 11**. The description of actual silvicultural activities shall be reported in **Appendix 23**. Actual watercourse buffer strip establishment shall be reported in **Appendix 11**.

5. Recreation:

Describe the actual recreational development activities carried out in the past year and show their locations on 1:12 500 maps.

6. Sublicensees:

Report the actual volume of wood (species and products) supplied to the Sublicensee (includes volume delivered by Licensee and the volume harvested by Sublicensee) on the License as specified in **Appendix 21.**

This report shall also include a description of the negotiations carried out between the Licensee and Sublicensee and whether Sublicensee carried out their own operation. The report shall include for each Sublicensee the date when negotiations initially commenced, the date when a final agreement was reached and whether or not the Regional Resource Manager or Advisory Board were involved.

7. Licensee Freehold Harvest

Report the volume by species and product actually harvested from freehold land owned or controlled by the Licensee.

This report should indicate the **total** harvest from freehold lands regardless of whether or not the wood went to mills in New Brunswick.

8. DNR Activities:

Within this section DNR will provide the License, no later than June 15 of the Report year, with appropriate information on all DNR administered activities on the License, including but not necessarily limited to:

(i) **Tendered & Untendered Permit Areas**

DNR shall report to the Licensee the volume by species and product actually harvested on tendered and untendered permit areas, including the Crown Land Fuelwood Program. At the discretion of the RRM, DNR shall request the Licensee to include specific areas to be aerially photographed at DNR cost at a scale of 1:12 500.

(ii) **Natural Resource Development Project**

DNR shall provide the Licensee with all appropriate Appendix information, to the same standards as specified for them, on all activities undertaken through the Natural Resource Development Project on the License. Such activities shall include precommercial thinning, plantation cleaning, fish enhancement, road construction and recreational facilities.

(iii) **Boundary Line Maintenance**

DNR shall report the actual boundary line maintenance conducted during the year on 1:125 000 maps.

(iv) **Test/Study Areas**

DNR shall provide the Licensee with the location, on 1:12 500 maps, and description using the appropriate Appendix for all test or study areas they have been involved with on the License.

(v) **Lease Areas**

DNR shall provide the License with the location(s) on 1:12 500 maps of all leases and reserves executed or cancelled during the Report year.

APPENDIX 1

TREATMENT STANDARDS FOR BASIC SILVICULTURE IN THE YEAR OF TREATMENT AND ASSESSMENT AT THE END OF FIVE YEARS

The level of yield for plantations and areas that are precommercially thinned is identified in the Wood Supply Analysis for each License area.

The following standards will be used in assessing Basic Silviculture treatment areas:

1. PLANTATIONS

Year of Treatment

Based on the sampling system described in **Appendicies 3 and 4** the following standards must be achieved:

a) **"Full" Planting** (Includes Site Preparation):

(i) With the exception of white pine the normal density standard will be 2 000 planted trees/ha, however lower densities (down to 1 650 planted trees/ha) will be acceptable, and will be reimbursed at reduced rates. Densities below 1 650 planted trees/ha will not be reimbursed under "full" planting criteria. Densities over 2 500 planted trees/ha will be reimbursed at a **reduced rate** according to the Reimbursement Policy.

b) **"Fill" Planting** (No Site Preparation):

(i) The normal density standard will be 2 000 trees/ha; comprised of planted plus natural seedlings. For natural regeneration stocking levels of commercial softwoods between 0% and 60%, planted tree densities as determined in (ii) below will be acceptable; provided the **planted plus acceptable natural seedlings** total at least 2 000 trees/ha and the stocking level is at least 90%.

(ii) Densities of "fill" planted seedlings eligible for reimbursement will be determined by the formula [2000 (1 - stocking level)]. Densities of "fill" planted seedlings over [2000 (1 - stocking level) (1.25)] will be reimbursed at a **reduced rate** according to the Reimbursement Policy.

Five Year Plantation Standard

Based on the sampling system described in **Appendix 5** the following standards must be achieved:

(a) Seventy-five percent (75%) minimum stocking of all planted and natural softwood species.

(b) Sixty-five percent (65%) minimum of stocked softwood plots at target density, where target density equals 1 or 2 softwood stems per plot (1 500 - 3 000 stems/ha).

(c) Twenty-five percent (25%) maximum of stocked softwood plots with hardwood or shrub species taller than the crop softwood tree.

2. PRECOMMERCIAL THINNING

Year of Treatment (species selection will favour softwood on S and SH sites)

Based on the sampling system described in **Appendix 7**, or otherwise approved by the RRM, the following standards must be achieved:

a) Crop tree density of 1500 to 3000 stems/ha after treatment.
b) Achievement of a minimum quality criteria threshold of 85 percent.

Five Years After Treatment

- Each precommercially thinned area must have between 1 500 and 3 000 trees/ha of the crop trees treated in a "free-to-grow" condition as specified in 1 (C) above.

3. PLANTATION CLEANING, PRE-1982

Year of Treatment

Based on the sampling system described in **Appendix 7** or otherwise approved by the RRM, the following standards must be achieved:

- Each area must have between 1 500 and 3 000 trees/ha of the crop trees treated after treatment.

Five Years After Treatment

- Each plantation cleaning area must have between 1 500 and 3 000 trees/ha of the crop trees treated in a "free-to-grow" condition.

APPENDIX 2

CRITERIA FOR SELECTION OF PLANTING AREAS

1. Cutovers should originate from softwood (S)*, softwood/hardwood (SH)** or intolerant hardwood/softwood (HS)*** covertypes. Exceptions may be approved by RRM, if justification is presented in the Operating Plan or where a relatively small patch(es) (less than 5 hectares) of the cutover block originated from other covertypes.

2. Acceptable natural stocking, as defined in **Appendix 8**, of commercial softwood must be less than 60%.

3. Where a Licensee's available planting area exceeds the Basic Planting requirements, planting areas must be selected on the basis of the best site quality on an ascending order of stocking priority. i.e. the best quality lower stocked planting sites must be planted first.

4. For stocking levels of commercial softwood below 40% - either full or fill planting is permitted.

5. For stocking levels of commercial softwood between 40% and 60% only fill planting is permitted.

   Treatment (a) "Full" plant (minimum 1 650 seedlings/ha) with adequate site preparation to reduce natural competition to acceptable levels prior to planting.

   Treatment (b) "Fill" plant an area which has not been site prepared such that the planted plus the natural seedlings equal at least 2 000 trees/ha and stocking level is at least 90%.

6. Plot size for all stocking sampling will be 6.67 m^2 (1.46 m radius).

7. Larch and pine species will not be planted within deer wintering areas.

* Softwood (S)= 75% or more softwoods
** Softwood/hardwood (SH) = softwoods between 50% and 75%
*** Intolerant hardwood/softwood (HS) = Softwoods between 25% and 50% with more intolerant hardwood than tolerant hardwood.

APPENDIX 3

PROCEDURE FOR PLANTATION ASSESSMENT IN YEAR OF ESTABLISHMENT

Purpose: As the basis to determine reimbursement payment to Licensee for plantations established under Basic Silviculture.

Method: Generally a plantation will be considered to be a single harvest block, unless a decision is made to divide it into sections or planting is undertaken in different years. It is recognized that within a plantation there may be a variation in site conditions, requiring different site preparation methods and species planted.

A reimbursement certification form will be completed for each plantation and separate sections will be identified when the following occur:

1) Any treatment requiring different reimbursement rates. Eg. site preparation versus no site preparation or different planting categories.

* 2) different species

* 3) different seed sources

* Any future reference to CROP ID in this manual will now be recognized as a code for species and seed source only. In general, only one seed source per species will be shipped to a plantation. On occasion more than one seed source per species may be shipped. If the EXACT delineation of these seed sources on a map is not feasible, i.e. separated by a road or an identifiable boundary, then a good APPROXIMATION will be acceptable.

DNR Sampling Procedure Will Be As Follows:

Circular plots containing 40 m^2 (3.57 m radius) will be distributed in a uniform grid pattern over the sample area.

Sufficient plots will be established to determine the density within $\pm$ 10% if the mean density is less than 2 300 trees/ha. If the mean density is between 2 300 and 2 500 trees/ha the density is to be determined within $\pm$ 20%. If the mean density is over 2 500 trees per hectare then the density is to be determined within $\pm$ 30%. In all cases the sampling is to be done to a confidence level of 90%. The number of plots required is calculated using the formula,

$$n = (t^2 s^2)/E^2$$

where "n" is the number of plots, "t" is the two-tailed t value from a table of t values, "s" is the standard deviation and "E" is 10%, 20%, or 30% (see above) of the mean number of trees per plot. A minimum of five plots is required in each plantation.

A seedling will be considered planted when it conforms with all of the following criteria:

1. Alive at the time of planting.
2. Dead when sampled but estimated to have been alive at time of planting and was planted properly.
3.** Firmly imbedded to root collar.
4. No exposed roots.
5. Not broken below the first (top) whorl.
6. Multiple stems are counted as one.
7. Not planted on a severe micro site, ie: rock, water.

** Some flexibility in this criteria is required. Generally if seedling is planted well but a small portion of paper pot is exposed the seedling should be counted. Alternatively if a seedling has root collar slightly below the surface it should be counted.

Information to be supplied by Licensee:

1. Vertical aerial photograph (1:12 500) and map (1:12 500) showing location of the plantation (as per **Appendix 19**).
2. Type of site preparation.
3. Area of the plantation (ha).
4. Crop identification (Crop ID's) by location within the plantation (each different Crop ID # requires a new silviculture treatment number, ie. different section number).

APPENDIX 4

PROCEDURE FOR FILL PLANTING ASSESSMENT IN YEAR OF ESTABLISHMENT

Purpose: As the basis to determine payment to Licensee for plantations established under Basic Silviculture.

Method: Each fill plant area will consist of homogeneous units with respect to factors such as site, species, stock type and time of planting.

DNR Sampling Procedure Will Be As Follows:

Circular plots to determine density containing 40 m^2 (3.57 m radius) will be distributed in a uniform grid pattern over the sample area. Plots to determine stocking (6.67m^2) will be established to use the same center point as the density plots.

Unless otherwise approved by the RRM there should be a minimum of twenty (20) plots in each fill plant area and for areas larger than 20 ha a minimum of one plot per hectare.

A seedling will be considered planted when it conforms with all of the following criteria:

1. Alive at the time of planting.
2. Dead when sampled <u>but estimated to have been alive</u> at time of planting and was planted properly.
3.* Firmly imbedded to root collar.
4. No exposed roots.
5. Not broken below the first (top) whorl.
6. Multiple stems are counted as one.
7. Not planted on a severe micro site, ie: rock, water.

* Some flexibility in this criteria is required. Generally if seedling is planted well but a small portion of paper pot is exposed the seedling should be counted. Alternatively if a seedling has root collar slightly below the surface it should be counted.

Information to be supplied by Licensee:

1. Vertical aerial photograph (1:12 500) and a map (1:12 500) showing location of fill planting area (as per **Appendix 19**).
2. Area of planting (ha)
3. Crop identification (Crop ID's) by location within the plantation (each <u>different</u> Crop ID # requires new silviculture treatment number, ie. different section number).

APPENDIX 5

PROCEDURE TO ASSESS (A) PLANTATIONS AND FILL PLANT AREAS IN YEAR FIVE: (B) CUTOVERS NOT DESIGNATED AS BASIC OR LICENSEE SILVICULTURE FIVE YEARS AFTER HARVEST

Purpose: The sustainable harvest determined for each Crown License is based partly on the condition and growth performance of plantations, silviculturally treated stands and on the condition and development of untreated cutovers. This provides the basis for assessing the performance of these areas with regard to regeneration, density, stocking, growth and competition in an effort to predict their development patterns.

Method: Fifth year surveys have been carried out in plantations and cutovers since 1987 and will be carried out annually into the future. The following sampling procedures will be undertaken by the Licensee. Specific survey instructions will be supplied annually by DNR.

Plot Size and Sampling Intensity:

1. Circular plots containing 6.67 m^2 (1.46 m radius) will be distributed in a uniform grid pattern over the sample area.

2. For all plantations greater than 20 ha, the sampling rate will be 1 plot per hectare.

3. For plantations less than 20 ha, 20 samples will be taken.

4. For all untreated cutovers greater than 24 ha, the sampling rate will be 1 plot per 1.2 hectares.

5. A minimum of 20 sample plots will be established for cutovers over 10 ha but less than 24 ha. No sample plots are required on cutovers less than 10 ha.

Crop tree Selection:

A. Plantations

1. If a planted tree is present, exhibits vigorous growth and is at least half as tall as any natural softwood present, then the planted tree is the crop tree.

2. If no planted tree is present or the tallest natural softwood (nonresidual) is more than twice the height of the planted tree, then the tallest natural softwood is the crop tree.

3. If no softwood (planted or natural) is present then, the tallest commercial hardwood is the crop tree.

4. If no commercial species are present; then, there is no crop tree.

B. Natural Cutovers

1. The tallest tree of a commercial species is the crop tree.

2. The crop tree should be a vigorous stem that is not the result of layering unless on a well drained site. Advanced regeneration is acceptable only if it has exhibited positive height growth since the time of harvest.

APPENDIX 6

CRITERIA FOR SELECTION OF NATURAL STANDS TO BE PRECOMMERCIALLY THINNED AND PLANTATIONS TO BE CLEANED

1. Selected stands must exhibit a **"free-to-grow"** condition following the thinning treatment.

2. Unless otherwise approved by the RRM the following criteria apply to the selection of softwood (>50% softwood crop tree stocking) natural stands to be precommercially thinned.

   a. Density - crop trees greater than 3 000 stems/ha

   b. Stocking - crop trees greater than 75%

   c. Crop trees - jack pine, spruce, fir, white pine, cedar, hemlock, red pine, larch, commercial hardwood or any combination.

   d. Height - the average height of crop trees will normally be 2.0 m to 7.0 m. Where Mountain maple is a significant competitor (greater than 25% stocking) the average crop tree height will be 3.0 m to 7.0 m.

   e. Where a Licensees' available thinning areas exceed the Basic Thinning requirements, thinning sites must be selected on the basis of the best site quality.

3. Unless otherwise approved by the RRM the following criteria apply to the selection of hardwood (>50% hardwood crop tree stocking) stands to be precommercially thinned:

   a. Density - same as above (2a)
   b. Stocking - same as above (2b)
   c. Crop trees - sugar maple, red maple, yellow birch, oak, ash, white birch, aspen, commercial softwood or any combination.
   d. Average height of crop trees 3.5 m to 7.0 m
   e. Site quality - same as above (2e)

4. Unless otherwise approved by the RRM the following criteria apply to the selection of plantations to be cleaned:

   a. Density - planted species and natural commercial softwood species greater than 3 000 stems/ha

   b. Pre-1982 plantations

5. In deer wintering areas (DWA's) precommercial thinning of softwood stands should favour the leaving of cedar, hemlock, spruce and fir over other commercial species.

APPENDIX 7

PROCEDURE TO ASSESS PRECOMMERCIALLY THINNED STANDS OR PLANTATIONS TO BE CLEANED

Purpose: As the basis for reimbursement payment to Licensee and to assess the performance of precommercially thinned areas and plantation cleaning areas in year one and five years after treatment.

Method: Data will be collected on all areas to be precommercially thinned or plantations to be cleaned prior to treatment and immediately after treatment and five years after treatment.

Data will be collected by Licensees as follows:

Prior to treatment

Circular plots 6.67 m^2 (1.46 m radius) will be distributed in a uniform grid pattern over the sample area. Each stand must be stratified before sampling if major differences occur within it.

Sampling intensity will be a minimum of one (1) plot per 1.2 ha for stands (blocks) over 20 ha. For stands of 20 ha and smaller, a minimum of 20 plots are required.

Data to be collected, for nonresidual species on each plot includes:

1. a. Areas not Previously Herbicided - Number of trees per plot by softwood and hardwood stems present; these will include the primary species to be thinned and all other competing woody stems 1 m or taller in height.

   b. Areas Herbicided At Least Three Years Prior To Thinning - Number of live trees AND dead stems per plot by softwood and hardwood stems present; (as 1.a. above).

2. Average height of the softwood and hardwood stems present on each plot.

Data summaries required for each individual treatment area are:

1. Aerial photograph and map (1:12 500) showing treatment area and location of survey lines (as per **Appendix 19**).
2. Density by species (trees per hectare).
3. Average height by species.
4. Statement of number of trees per hectare by species before treatment.

Immediately After Treatment

The quality criteria level should be calculated as an average of all plots sampled in the treatment area. Quality criteria sample plots need only be established if preliminary visual assessment suggests possible quality factor problems.

DNR sampling procedure will be as follows:

Circular plots 40 m^2 (3.57m radius) will be established at uniform intervals and evenly spaced over the entire stand. Sampling intensity will be a minimum of one (1) plot per three (3) hectares of treated area.

An area will be considered as acceptable and complete when it conforms with the following guidelines.

Data to be collected on each plot include:

1. Number of crop trees by species.

2. Occurrence of unacceptable quality factors by category.

The percentage deduction for each category will be as follows; in assessing each plot.

Quality Factor (category)	Percent
a) Crop tree selection	5%
b) Excessive cutting of potential crop trees (i)	5%
c) Crop tree damage	3%
d) Crop tree spacing	3%
e) Uncut competition (ii)	3%

NOTE: For a) to e) - Count each occurrence.

f) Live branches on cut stumps (ii)	3%
g) Incomplete cuts	1%

NOTE: For f) and g) - Count each occurrence only once.

(i) Undamaged crop trees should be at acceptable stocking levels over the treated area as described in **Appendix 6** section 1(b). The minimum acceptable spacing between crop trees is one (1) meter (to accommodate any natural openings).

(ii) Count only if considered to be potential future competition.

Five years after treatment

The Licensee shall report on the general condition of each precommercially thinned area 5 years after treatment (no sample plots required). Information required includes stand classification, crown closure, density (crop trees and competition), age, average height, average diameter, general comments. Where mortality (greater than 10%) or ingrowth of competition which is overtopping the softwood trees has occurred within the treated area or when requested by the RRM the following procedure will be undertaken:

Circular plots containing 40 m^2 (3.57 m radius) will be distributed throughout the treated area so as to be representative of the area. Each stand must be stratified before sampling if major differences occur within it.

Sampling intensity will be one plot for every four hectares.

Data to be collected on each plot includes:

1. Number of trees per plot by species; these will include the primary species thinned and other competing woody stems 1 m or taller in height.

2. Average height of each species on each plot.

3. Average diameter of each species on each plot.

Data summaries required for each individual treatment area:

1. Map (1:12 500) showing treatment area and location of survey plots.

2. Density by species (trees per hectare).

3. Average height and diameter by species.

APPENDIX 8

STANDARDS TO DETERMINE ACCEPTABLE NATURAL SOFTWOOD REGENERATION

Purpose: To provide uniformity in the determination and evaluation of the relative success of natural softwood regeneration according to prescribed stocking standards on areas proposed for planting.

Definition: The frequency of occurrence of acceptable seedlings and advanced growth.

Timing of Evaluation:

1) Area harvested during September to April period - evaluate in August following harvest or later.

2) Area harvested during May to August period - evaluate in following season in July or later.

3) An earlier time of evaluation may be mutually agreed upon with the approval of the RRM.

Plot Size and Sampling Intensity:

1) Minimum plot intensity is 1 plot per hectare.

2) Plot size is 6.67 m^2 (1/1 500).

3) Minimum number of plots is 20.

4) Plots must be established using a uniform grid system.

5) Plots are not to be established within 50 M of a road on a full tree operation.

6) Plots should not be placed in nonproductive areas, i.e., roads, swamps and rocks.

7) An evaluation plot is considered stocked when it contains a minimum of 1 acceptable seedling.

Acceptable Natural Regeneration: The final standard to be based on work currently in progress under New Brunswick Forest Research Advisory Committee (NBFRAC). In the interim, the proposed is an attempt to reduce unnecessary future remedial treatments of plantations. The following seedlings will **NOT** be counted in a survey:

1) Layerings, unless on a well drained site.

2) Seedlings with over 50% of circumference of stem girdled (with bark removed).

3) Seedlings with a live crown ratio of less than 20% (all live germinants will be counted).

4) Advanced stunted fir regeneration.

Implementation: The above guidelines may be changed in order to reflect local conditions, pending approval by the Regional Resource Manager.

APPENDIX 9

PRODUCT LIST

SWV -	Softwood Veneer
SPFL -	Spruce and Fir Sawlogs
SPFS -	Spruce and Fir Studwood
SPFF -	Spruce and Fir Fencing
JPL -	Jack Pine Sawlogs
JPS -	Jack Pine Studwood
JPF -	Jack Pine Fencing
WPV -	White Pine Veneer
WPL -	White Pine Sawlogs
CEL -	Cedar Sawlogs
CEF -	Cedar Fencing
HEML -	Hemlock Sawlogs
LL -	Larch Sawlogs
RPL -	Red Pine Sawlogs
LATH -	Lathwood
SPFP -	Spruce and Fir Pulpwood
JPP -	Jack Pine Pulpwood
CEP -	Cedar Pulpwood
HEMP -	Hemlock Pulpwood
LP -	Larch Pulpwood
WPP -	White Pine Pulpwood
RPP -	Red Pine Pulpwood
HWV -	Hardwood Veneer
PV -	Poplar Veneer
HWL -	Hardwood Sawlogs
PL -	Poplar Sawlogs
HWP -	Hardwood Pulpwood
PP -	Poplar Pulpwood
HWF -	Hardwood Fuelwood
SPOL -	Spoolwood

SWC -	Softwood Chips
HWC -	Hardwood Chips
HWFC -	Hardwood Full-Tree Chips
SHAV -	Shavings
SWSD -	Softwood Sawdust
HWSD -	Hardwood Sawdust
RPPO -	Red Pine Poles
JPPO -	Jack Pine Poles
SPPO -	Spruce Poles
CEPO -	Cedar Poles
CESH -	Cedar Shingles
HWTI -	Hardwood Ties
HOGF -	Hog Fuel
LT -	Landscape Ties

TLSPF-	Tree Length Spruce and Fir
TLJP -	Tree Length Jack Pine
TLCE -	Tree Length Cedar
TLHEM-	Tree Length Hemlock
TLWP -	Tree Length White Pine
TLRP -	Tree Length Red Pine
TLHW -	Tree Length Hardwood
TLP -	Tree Length Poplar
TLHWF-	Tree Length Hardwood Fuelwood

These codes may only be used if the material is left **on the block** at the end of the fiscal year.

APPENDIX 10

REQUIREMENTS FOR FOREST ROADS AND LOGGING ROADS ON CROWN LAND

A. Introduction

This section provides minimum specifications applicable to each category of road and required procedures for planning, locating, constructing, maintaining, closing, abandoning and signing of roads.

Some forest roads constructed prior to the issuance of Crown Timber Licenses in 1982 exist at a standard below the minimum accepted, however, any subsequent construction or upgrading of forest roads shall be carried out to meet minimum standards.

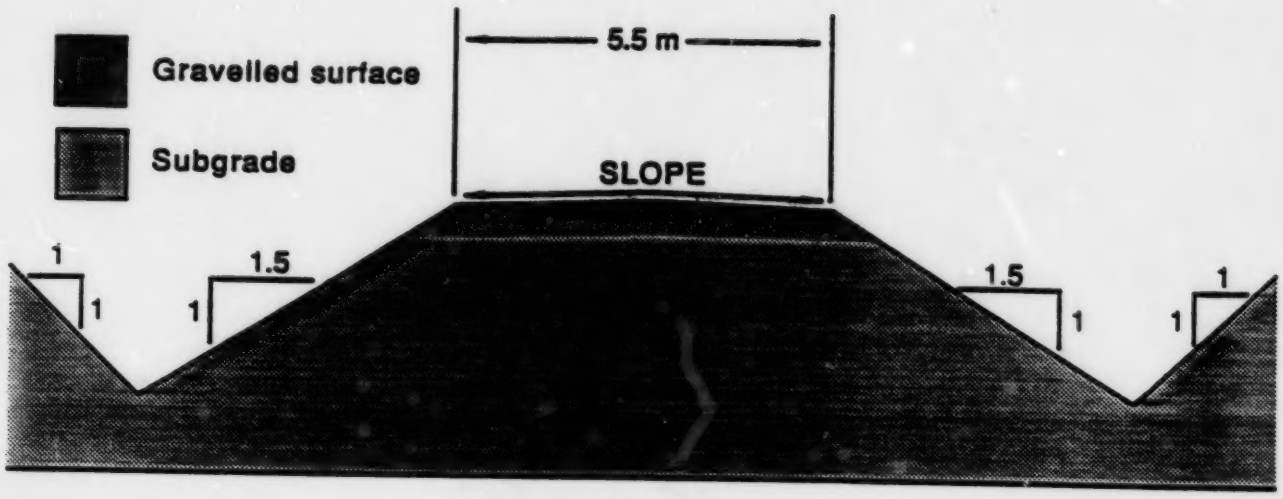
B. Standards and Specifications

1. Forest Roads

Minimum specifications for forest roads ensure quality to meet the needs of Licensees, Sublicensees, other users and the public. Forest roads are to be part of a permanent road system for the license designed to provide access for forest management activity, mineral resource development and recreational use.

The design of a forest road is dependent upon design loadings, vehicle dimensions, travel speeds, sight distances and traffic densities that are required during the life of the road. The minimum specifications for a forest road are described by the following:

FOREST ROAD



Typical Cross Section

Specifications:

Maximum cleared right-of-way,	- 30 m
Minimum shoulder to shoulder,	- 5.5 m
Minimum gravelled surface,	- 5.5 m
Minimum sight distance,	- 60 m
Minimum ditch depth,	- 0.3 m
Brush disposal	- burning, burying, bullpenning, or windrowing.
Traffic control devices	- regulatory signs
Structures	- 15 year life minimum

2. Logging Roads

Minimum specifications for logging roads ensure adequate quality to meet the needs of the Licensees, Sublicensees and the Crown. Logging roads are generally temporary; forest management and environmental protection are the only functions that need be considered for this category of road.

Logging roads shall be built for the primary purpose of timber extraction and their layout and design are dependant on the type of harvesting system used by the Licensee.

The minimum specifications for a logging road are described by the following:

Specifications:

Maximum cleared right-of-way*	- 20 m (in leave strip, N/A blocks)
Maximum bulldozed width*	- 20 m (including brush disposal areas)
Ditch depth	- where required
Sight distance	- limited to what is considered safe and feasible for the hauling unit
Brush disposal	- burning, burying, bullpening, or windrowing
Traffic control devices	- N/A
Landing size and spacing	- dependent upon harvesting system
Structures	- temporary in nature and may be removed after use with the prior approval of DNR

*may be increased to 30 m and 25 m, respectively, at the discretion of the RRM.

C. Required Procedures:

1. Planning and Locating

1.1 The location of a road shall be defined on the ground by means of a clearly marked centre line or sidelines prior to clearing of the right-of-way.

1.2 A road right-of-way built parallel to a stream must have a treed buffer of at least 30 m for any stream >0.5 m, unless otherwise specified by the RRM.

1.3 Alterations to watercourses draining an area exceeding 600 ha at the site of the alteration require a Watercourse Alteration Permit from the Department of the Environment. All alterations to watercourses draining 600 ha or less require approval by DNR.

1.4 Before commencing the construction of a road, the Licensee must have an approved Operating Plan and the necessary permits.

1.5 A Licensee shall reclassify an inactive logging road into a forest road at the request of the RRM. If the road is to be physically improved, as opposed to a reclassification on paper, then it shall be done at the expense of DNR.

1.6 Where a forest road not exceeding 1.5 kilometres in length crosses lands owned or controlled by a Licensee, the Licensee shall grant a free right-of-way to the Crown. The Licensee shall construct and maintain this portion of forest road to the same standard as the forest road on Crown Land.

2. Planning and Locating

2.1 The Licensee shall construct roads to the standards specified in the approved Operating Plan.

2.2 Removal of all merchantable timber from a road right-of-way shall conform to requirements under **Appendix 13 - Harvesting and Utilization Requirements.**

2.3 All wood harvested from a forest road right-of-way shall be landed within the width of the right-of-way. All leaning and damaged merchantable trees along the right-of-way edge shall be utilized.

2.4 All roots, stumps, unmerchantable trees and overburden material, must be removed and disposed by burning, bullpenning, burying or windrowing.

2.5 Within harvested areas, the area bulldozed to bare mineral soil and/or covered with windrow material shall not exceed five percent. Areas in excess of five percent shall be rehabilitated by replacing the topsoil and sloping the land to that of the original terrain to allow for natural or artificial regeneration.

2.6 Bullpens shall be a minimum of 30 m apart if on one side of the right-of-way or a minimum of 60 m apart if on both sides of the right-of-way. Debris shall not be pushed into standing timer. Bullpens shall be flattened and covered with soil for aesthetic reasons.

2.7 Bullpens or windrows shall not be located within 30 m of a watercourse.

2.8 On steep side slopes or on wet and unstable areas requiring brushmats, right-of-way debris may be buried in the road subgrade. Merchantable trees shall not be buried in roads for brushmatting purposes unless the Licensee has permission to do so from the RRM.

2.9 The minimum acceptable culvert for installation in an artificial surface drainage channel shall be a circular pipe 300 mm in diameter.

2.10 The size of drainage structures shall be determined according to the area of opening required at peak water flow. The minimum acceptable culvert that may be placed in a natural watercourse whose channel is 0.5 m and wider*, or in an artificial channel constructed for reasons other than surface drainage, shall be a circular pipe 760 mm in diameter or equivalent unless otherwise approved by RRM. This requirement also applies to culverts installed as part of a multiple culvert installation. The minimum acceptable culvert that may be placed in a natural watercourse whose channel is less than 0.5 meters shall be a circular pipe 450 mm in diameter or equivalent.

2.11 The maximum slope of culverts in fish populated natural watercourses is 0.5%. In cases where the stream gradient does not allow for this requirement then pipe arches, arches, interior baffling, or stilling basins shall be used to maintain adequate depth of flow and velocity for fish passage.

2.12 Culverts in natural watercourses shall be installed on a uniform slope such that the inlet and outlet are set at least 15 cm into the streambed, except in multiple culvert installation.

* For road construction purposes channel width will be an average of width measurements taken across the road right-of-way.

2.13 Multiple culvert installations shall be restricted to two culverts in a natural watercourse channel. Multiple culverts shall be placed a distance of one half the diameter or span apart, or 1 m, whichever is greater. The bottom of one culvert shall be set 15 cm into the streambed, with the second culvert set at an elevation equal to the original streambed.

2.14 Drainage structures installed in natural watercourses shall require stabilization of inlet and outlet fill slopes at the time of installation by one of the following means:

a) rip rap

b) shear walls

c) establishment of a vegetated 2:1 slope prior to September 15
in combination with a) or b) above.

Rip rap shall consist of durable quarried or field rock with at least 60% of the rock 0.03 m or larger. Inlet and outlet fill slopes of culvert shall be stabilized to a height of at least 0.5 metres above the top of the culvert.

2.15 On steep grades, where the soil type is susceptible to erosion, culverts shall be skewed across the road so that water will flow through at a uniform rate. Spacing for cross drainage culverts or water diversions shall be determined as follows:

$$\text{Spacing} = \frac{500\ \text{m}}{\text{percent road grade}}$$

Example: (Figure 1, page 36)

2.16 On steep grades groins and diversion ditches shall be used to restrict surface drainage flow down ditches and to dissipate this flow away from the road and stream into vegetation or standing timber.

2.17 Tractor work shall not be permitted outside the road right-of-way width. This applies particularly to the channelization of natural watercourses, trenching for additional fill and the building of runoffs from culverts.

2.18 For natural watercourses whose channel is 0.5 m or wider a 30 m no-grub zone shall be maintained except immediately underlying the roadbed (Figure 2a). For natural watercourses whose channel is less than 0.5 m in width a 10 m no-grub zone shall be maintained except immediately underlying the roadbed. Regardless of the watercourse

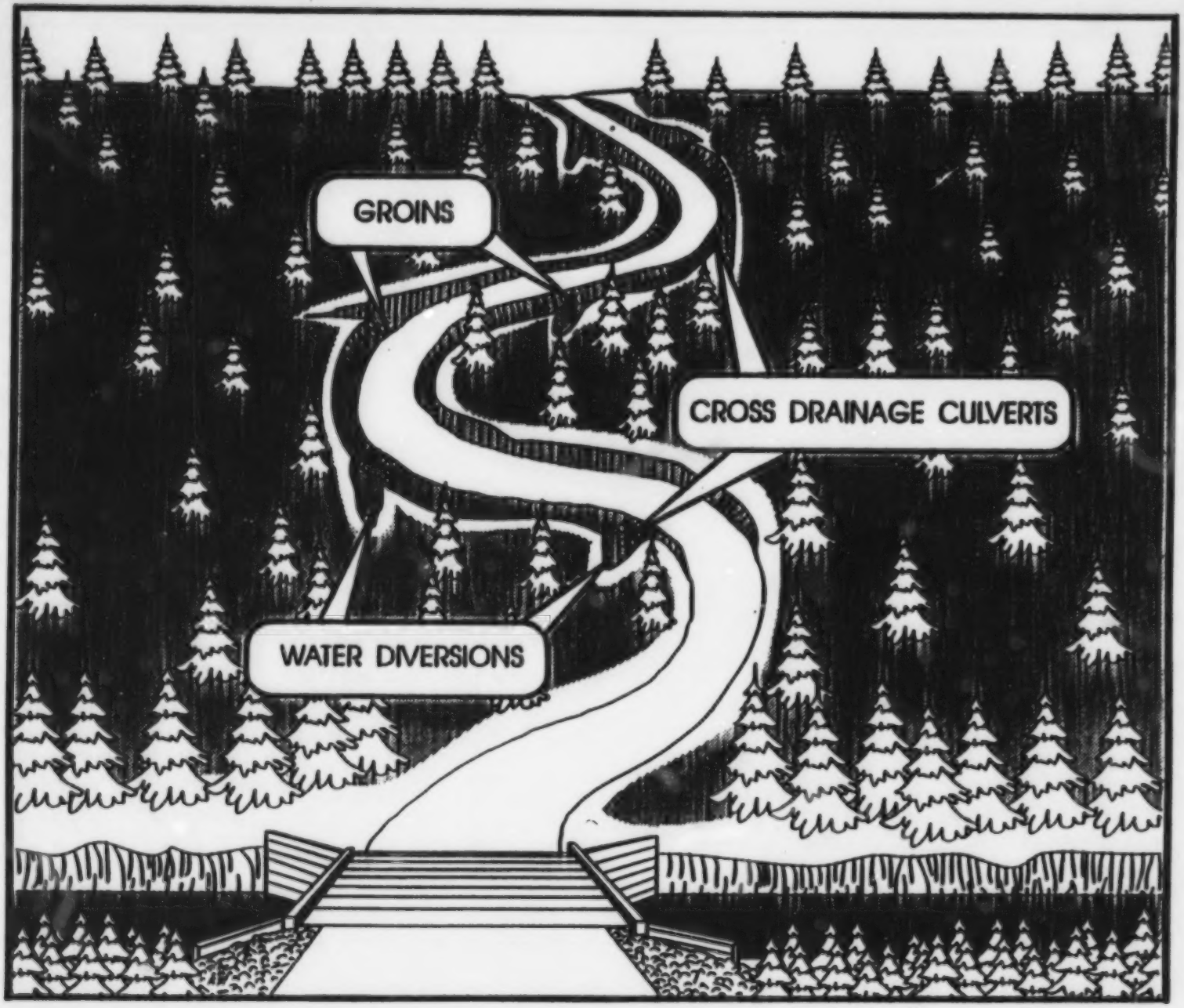


Figure 1: Cross drainage culverts and water diversions

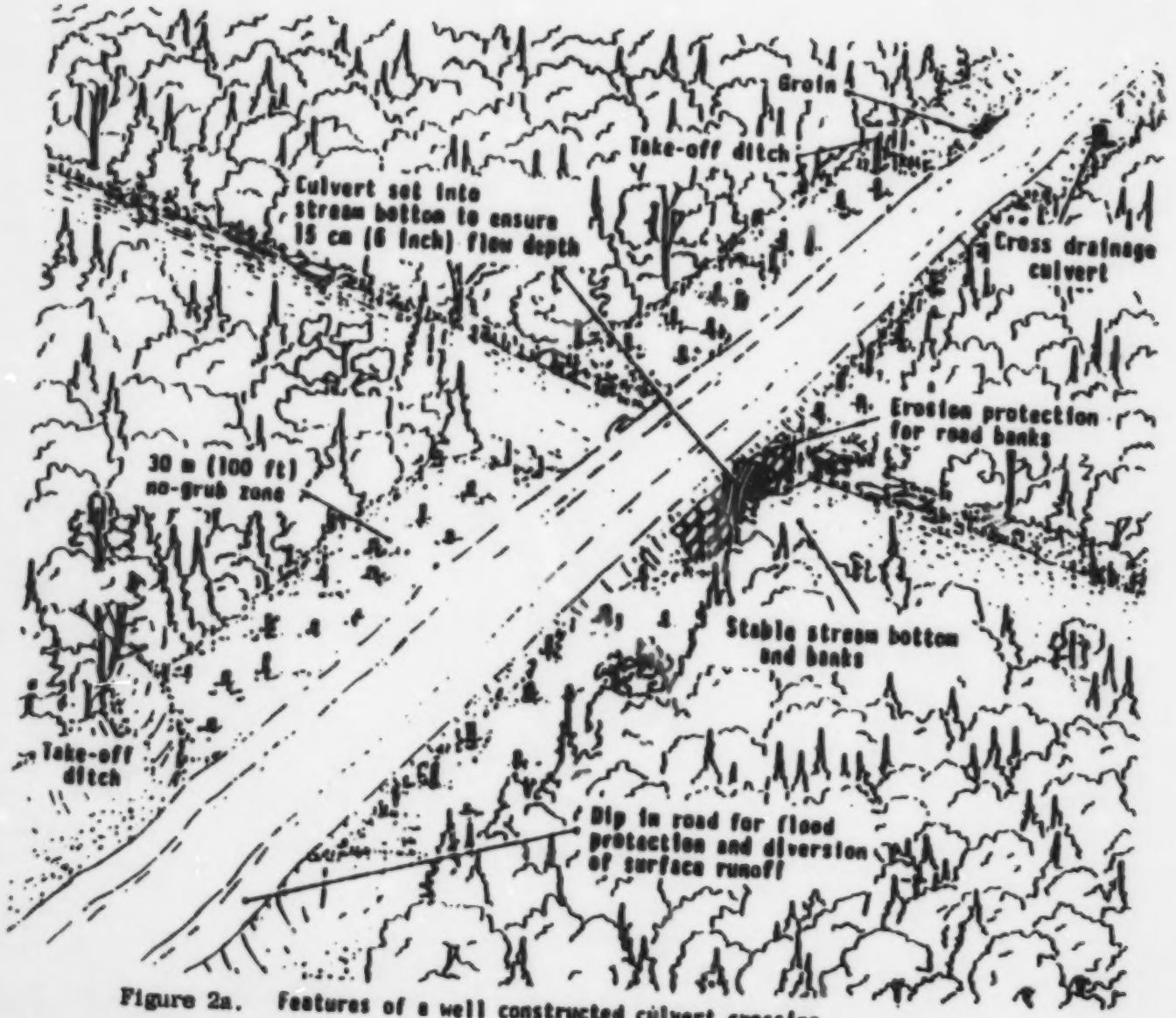

Grain
Take-off ditch
Culvert set into stream bottom to ensure 15 cm (6 inch) flow depth
Cross drainage culvert
Erosion protection for road banks
30 m (100 ft) no-grub zone
Stable stream bottom and banks
Take-off ditch
Dip in road for flood protection and diversion of surface runoff

Figure 2a. Features of a well constructed culvert crossing

width no harvesting of nonmerchantable wood shall be undertaken in the right-of-way area within 10 m of the watercourse.

Temporary watercourse crossings by equipment shall be confined to a single narrow area, and streambed or stream bank restoration shall be undertaken if required.

2.19 Galvanized steel pipe, concrete pipe, plastic pipe or squared timber shall be used in culvert installations on forest roads and logging roads. The length of the culvert pipe shall be determined by the formula LC = W + 4D (to achieve a 2:1 slope at the culvert openings); where LC equals length of culvert, W equals the width of road from shoulder to shoulder and D equals the depth of fill over the culvert from the bottom of the pipe. Where the culvert has been stabilized by cribbing or shear wall, the 2:1 slope requirement shall apply to the area from the top of the cribbing or shear wall to the road surface.

2.20 During bridge construction, excavation for the piers, footings and abutments shall be conducted in such a manner as to keep the work area separated from the watercourse (Figure 2b). Excavated materials shall not be allowed to enter the watercourse. Cofferdams shall be made of nonerodible material to separate work areas from watercourses. Care shall be taken during the removal of the cofferdam, and the streambed shall be returned to its original condition.

2.21 Pollutants (such as lime, cement, creosote, deicing agents, etc.) and debris shall be prevented from entering the watercourse.

2.22 Drainage structures shall be designed to support the design loadings.

2.23 Drainage structures shall be installed between June 1st and Sept. 30th unless otherwise approved by the RRM.

2.24 Additional measures to protect the environment, such as slope stabilization, may be requested by the RRM.

2.25 Faces of gravel or borrow pits must be stabilized by backsloping the pit to the original ground contour.

3. Maintaining

3.1 The Licensee shall maintain all forest roads to their design standard and specifications as stated in the approved Operating Plan.

3.2 Maintenance of forest roads shall include bridge/culvert repair and/or installations, gravelling, ditching, brush removal, grading and sign installations. Where a forest road

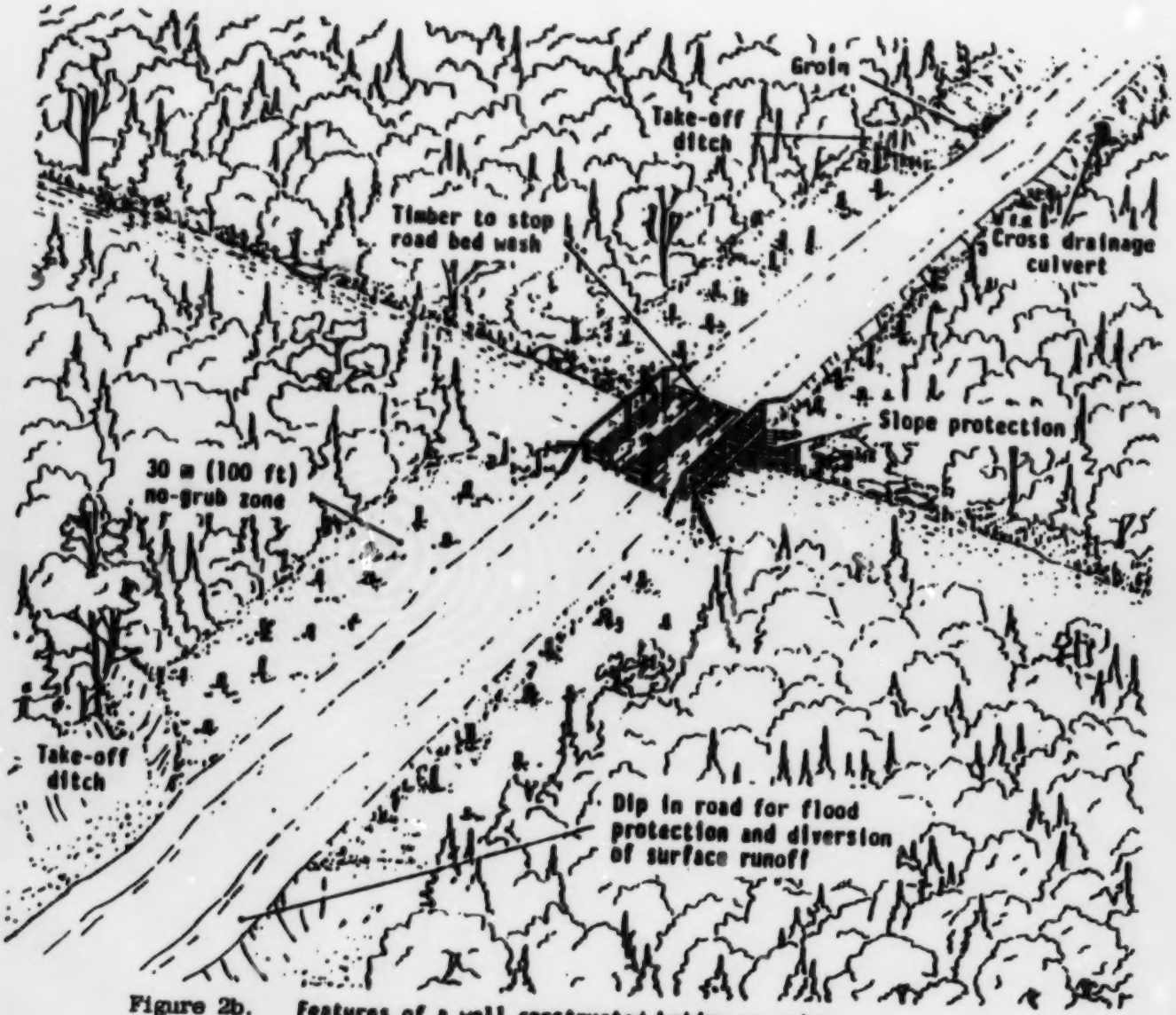

Groin
Take-off ditch
Timber to stop road bed wash
Cross drainage culvert
Slope protection
30 m (100 ft) no-grub zone
Take-off ditch
Dip in road for flood protection and diversion of surface runoff

Figure 2b. Features of a well constructed bridge crossing

is not being maintained to the satisfaction of the RRM, the RRM may undertake the work and the Licensee will be responsible for all related costs.

3.3 Where it is necessary to replace an existing bridge or culvert, the Licensee shall obtain a Watercourse Alteration Permit and/or DNR approval.

3.4 Where it is necessary to clear forest road rights-of-way of vegetation by chemical means, the Licensee shall acquire a Pesticide License from the Pesticide Advisory Board and a permit from the Minister of the Department of Environment.

3.5 The Licensee shall be required to rectify environmental problems on forest and logging roads as requested by the RRM.

4. Closing

4.1 Forest roads on Crown Lands will only be closed through the authority of the RRM. If the road is closed at the request of the Licensee, the Licensee shall be responsible for the proper placement of barricades, approach and road closed signs. The Licensee shall give prior warning to Sublicensee and other industrial users of the closure. These responsibilities shall be DNR's if the road is closed at the request of the RRM.

4.2 A Licensee may restrict access to the public on an active logging road by gating or signing with the approval of the RRM.

5. Abandoning

5.1 Forest roads and logging roads on Crown Lands will only be abandoned (vehicle access restricted) through the authority of the RRM.

6. Signing

6.1 All regulatory traffic signs used on forest roads shall conform to a standard acceptable to the RRM.

6.2 The Licensee shall be responsible for the erection and maintenance of regulatory signs on forest roads. Regulatory signs shall indicate required actions that the operator of a motor vehicle must take for the proper and safe operation of that vehicle.

6.3 Bridges that do not support design loadings shall be clearly posted stating the maximum allowable gross vehicle weight.

APPENDIX 11

DESCRIPTION OF PROPOSED AND ACTUAL HARVESTING OPERATIONS

LICENSE _____

AMENDMENT NUMBER ☐☐

LOCATION ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

OPERATION ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

MAP NUMBERS ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐

PHOTO NUMBERS ☐☐☐☐ ☐☐☐ ☐☐☐☐ ☐☐☐

OPERATOR (P) ☐ ☐☐☐☐☐☐☐☐☐

(A) ☐ ☐☐☐☐☐☐☐☐☐

OPERATOR SEASON (P) MM ☐☐ TO MM ☐☐ (A) MM ☐☐ TO MM ☐☐

BLOCK NO. ☐☐☐ ☐☐☐☐☐☐☐

AMENDMENT DATE ☐☐ ☐☐ ☐☐

HARVEST METHOD (P) ☐☐ (A) ☐☐

AREA (ha) (P) ☐☐☐☐ (A) ☐☐☐☐

SOFTWOOD HARVEST SYSTEM (P) ☐☐☐☐ (A) ☐☐☐☐

HARDWOOD HARVEST SYSTEM (P) ☐☐☐☐ (A) ☐☐☐☐

PROPOSED AND ACTUAL HARVEST						
PRODUCT	CRUISE VOLUME	PROPOSED HARVEST	PROPOSED DESTINATION	ACTUAL HARVEST	ACTUAL DESTINATION	REMAINING VOLUME

EXPLANATION OF PROPOSED AND ACTUAL HARVESTING OPERATIONS

License
- name of license
- eg. Upsalquitch

Amendment No.
- 2 numeric characters

Location
- 1 to 20 alphameric characters
- descriptive information on block location
- eg. Four Mile Brook

Operation
- 1 to 20 alphameric characters
- descriptive information on operation
- eg. Camp 69

Map Nos.
- 16 numeric characters - 4 groups of 4 to accommodate up to 4 different map sheets
- use actual 1:12 500 map numbers

Photo Nos.
- 16 numeric characters - 2 groups of 8 to accommodate up to 2 different photographs. In each group characters 1-5 are for flight line and characters 6-8 are for photo number.

Operator
- 11 alphameric characters on following format:

  Character 1 - L : license operations
  - S : sublicensee operations
  - C : combination of above

  Characters 2-11 - name of sublicensee conducting operation (see **Destination Code Names** Page 49)

Operating Season - 4 numeric characters - 2 groups of 2:

Characters 1, 2 - month of commencement

Characters 3, 4 - month of completion

Block No. - 9 numeric characters on following standard format:

Character 1	- region number	eg. 1
Characters 2,3	- license number	eg. 01
Characters 4,5,6,7	- block number	eg. 0023
Characters 8,9	- year	eg. 88

Using the above example, block number would be entered as 1 01 0023 88.

Amendment Date - 6 numeric characters on the following format:

Characters 1,2 - year

Characters 3,4 - month

Characters 5,6 - day

eg. June 4, 1988 would be written 88 06 04

Harvest Method - 2 alphameric characters as per following coded format:

CC - clearcut

SC - selection cut

PC - partial cut

RR - residual removal

SA - salvage

CU - cleanup

FC - fire cleanup

FW - fuelwood

Area (ha) - 4 numeric characters

Harvest System - Numerical Identification to show both proposed and actual

Harvest System - Numerical identification to show both proposed and actual harvesting systems of both softwood and hardwood products.

- 4 numeric characters on following format

  Character 1 - felling system

  Character 2 - delimbing system

  Character 3 - forwarding system

  Character 4 - slashing system

The following coding system to apply:

1--- felled manually

2--- felled mechanically

-1-- delimbed manually (bush)

-2-- delimbed manually (roadside)

-3-- delimbed mechanically (bush)

-4-- delimbed mechanically (roadside)

-5-- full tree chipped

--1- forwarded shortwood

--2- forwarded tree length

--3- forwarded full tree

--4- forwarded by horse

---0 not slashed

---1 slashed manually (bush)

---2 slashed manually (roadside)

---3 slashed mechanically (roadside)

---4 slashed mechanically (bush)

---5 slashed mill

Proposed and Actual Harvest

Product - 1 to 5 alphameric characters as per **Appendix 9**

Cruise Volume
- 1 to 5 numeric characters
- actual block cruise volumes expressed in m^3

Proposed Harvest
- 1 to 5 numeric characters
- proposed harvest volumes expressed in m^3

Proposed Destination - 1 to 10 alphameric characters as per explanation **Destination Code Names**

Actual Harvest
- 1 to 5 numeric characters
- actual harvest volumes expressed in m^3

Actual Destination - 1 to 10 alphameric characters as per explanation **Destination Code Names**

Remaining Volume
- 1 to 5 numeric characters
- standing residual volume expressed in m^3

In addition to providing the information in **Appendix 11** the Licensee shall provide a summary sheet listing the stand numbers by map sheet for each proposed harvest block following the format shown below:

Stand Listing by Harvest Block

Block No.	Map No.	Stand Nos.

APPENDIX 11

EXPLANATION OF PROPOSED AND ACTUAL

HARVESTING OPERATIONS CONTINUED

In the operating plan and in the annual report the Licensee will provide the following information in addition to the standard **Appendix 11** information for blocks with planned or actual watercourse buffer strips (Watercourse Buffer Strip Report Section) and for blocks with planned or actual timber harvesting within site-specific wildlife habitats or watercourse buffer strips (Habitat Management Activity Section).

HARVEST BLOCK NUMBER: Enter the 9 digit harvest block number (region/license/block/year).

WATERCOURSE BUFFER STRIP REPORT:

Watercourse Name: Enter the most commonly used name of the watercourse (e.g. Thibodeau Brook). Small unnamed watercourses requiring buffer strips should be assigned identifying letters and associated with their closest tributary (e.g. Watercourse A - Thibodeau Brook). These watercourses should be marked on the harvest block maps accompanying **Appendix 11**.

Slope: Enter the slope (percent) of the watercourse bank as determined by field measurement or obtained from topographic 1: 50 000 or topographic orthophoto maps.

Buffer Width - Planned (P): Enter the planned/proposed buffer strip width (metres) accepted by DNR.

Buffer Width - Actual (A): Enter the actual buffer strip width applied as determined from field measurement or from the required aerial cut photo.

Buffer Length - Planned (P): Enter the planned/proposed length (metres) of the watercourse buffer accepted by DNR.

Buffer Length - Applied (A): Enter the actual buffer length (metres) applied as determined from field measurement or from the required aerial cut photo.

Buffer Strip Description: Indicate the purpose of the watercourse buffer and describe the structure of the buffer strip (e.g. watercourse protection/aesthetics, alders and standing timber, SPBF M).

Buffer Strip Harvest: Indicate YES (Y) or NO (N) if a timber harvest operation is planned (P) or actually (A) occurred in the watercourse buffer strip.

HABITAT MANAGEMENT ACTIVITY SECTION:

The following information will be provided where site-specific habitat management activities associated with the harvest block are planned or actually occurred.

SITE-SPECIFIC HABITAT TYPE:

Buffer Strip: If applicable identify in which buffer(s) identified above timber harvesting is planned or actually occurred.

Deer Wintering Area (DWA): If applicable enter the 5 digit deer wintering area number.

Other Habitat Type: Where the site-specific habitat is neither a DWA or watercourse buffer enter the appropriate site-specific habitat type (e.g. moose calving area).

TREATMENT AREA DESCRIPTION: Describe the topography (slope and aspect) and forest (stand) structure and condition within the treatment area. Where necessary identify subsections within the treatment area. (e.g. Section A: 0-5% SW slope, BF 90% dead and dying, rSP stable mature, patches of natural softwood regeneration established. Section B: 30% NE slope, rSP stable mature, no advanced regeneration).

TREATMENT OBJECTIVE: Explain the objective of the treatment as it relates to the maintenance, enhancement or production of the site-specific habitat (e.g. Maintain winter shelter integrity for deer while stimulating natural softwood regeneration and browse production).

TREATMENT DESCRIPTION: Describe the details of the treatment [eg. Section A: selective removal of dead and dying fir and spruce (approximately 25% of merchantable softwood basal area) with 4 metre trails spaced at 40 metre intervals. Section B: selective removal of 20% basal area across merchantable diameters using the same trail cut system as above].

APPENDIX 11 CONT'D:

HARVEST BLOCK #: | | | | | | | | | |

WATERCOURSE BUFFER STRIP REPORT:

Watercourse Name	Slope %	Buffer Strip Width (m) P	Buffer Strip Width (m) A	Buffer Strip Length (m) P	Buffer Strip Length (m) A	Buffer Strip Description	Buffer Harv. P	Buffer Harv. A

SITE-SPECIFIC HABITAT TYPE:

BUFFER STRIP	DWA #	OTHER HABITAT TYPE

TREATMENT AREA DESCRIPTION:

TREATMENT OBJECTIVE:

TREATMENT DESCRIPTION:

DESTINATION CODE NAMES

Licensees

	1 2 3 4 5 6 7 8 9 10
N.B. International Paper Co.	N B I P
Stone-Consolidated Pulpmill	S T O N E - P
Stone-Consolidated Sawmill	S T O N E - S
Miramichi Pulp & Paper (Groundwood Mill)	M P P I - G
Miramichi Pulp & Paper (Sawmill)	M P P I - S
Miramichi Pulp & Paper (Kraft Mill)	M P P I - K
Miramichi Pulp & Paper (Alcell)	M P P I - A
Norbord Inc.	N O R B O R D
J.D. Irving - Deersdale	J D I - D E E R S
J.D. Irving - Grand Lake Timber	J D I - G L T
J.D. Irving - Sussex	J D I - S U S S E X
J.D. Irving - St. Leonard	J D I - S T L E O N
J.D. Irving - Paper Mill	J D I - P A P E R
J.D. Irving - St. John Mill	J D I - S T J O H N
J.D. Irving - Utopia Mill	J D I - U T O P I A
J.D. Irving - Veneer Siding	J D I - V E N E E R
St. Anne Nackawic - Pulpmill	S T A N N E - P
Juniper Lumber Company	J L C
Fraser Inc. - Edmundston	F R A S E R - E D M
Fraser Inc. - Plaster Rock	F R A S E R - P L
Fraser Inc. - Atholville	F R A S E R - A T H

DESTINATION CODE NAMES

Sublicensees

	1 2 3 4 5 6 7 8 9 10
A. Arsenault	A R S E N A U L T
F.C. Alexander	A L E X A N D E R
Arthurette Cedar	A R T H U R C E
Arpin	A R P I N
Atlantic Pressure Treating	A P T
Bacon's Lumber	B A C O N
Le Scierie Balmoral	B A L M O R A L
E. Hollis Bartlett	B A R T L E T T
J. Basque	B A S Q U E
D.E. Beckett	B E C K E T T
G. Begin	B E G I N L U M B
Oscar Belanger	B E L A N G E R
Bishop's Lumber	B I S H L U M B
Blackville Lumber	B L A C K V L U M
Gerard Boudreau	B O U D R E A U
Boreal Woodcraft	B O R E A L
Brown's Contracting	W B R O W N
Brown Lane Lumber	B R O W N L A N E
Brunswick Pallet	B R U N P A L L E T
Burchill Plywood	B U R C H I L L
Cedre Restigouche	C E D R E R E S T
Chaleur Pulpwood	C H A L E U R
Circle T Lumber	C I R C L E T
Clair Industrial Development	C L A I R I D E V
Colonial Fence	C O L F E N C E
A. Colter	C O L T E R
H. Cormier	C O R M I E R
R. Couturier	C O U T U R I E R
Crown Fence Supply	C R O W N

DESTINATION CODE NAMES

Sublicensees (cont'd)

	1 2 3 4 5 6 7 8 9 10
Curley, H.	CURLEY
H.J. Crabbe	CRABBE
Dead River - Canaan	DEAD R CAN
- Sussex	DEAD R SUS
Deep Wood Cedar	DEEP WOOD
Delco Forest Prod.	DELCO
Devon Lumber - Chipman	DEVON CHIP
- Harvey	DEVON HARV
- Nashwaaksis	DEVON NASH
- Fredericton	DEVON FRED
Domtar Chemical	DOMTAR
Moulin Duclos	DUCLOS
Dickson, K & R	DICKSON
T.P. Downey	DOWNEY
Eastern Veneer	EAST VEN
Fawcett Enterprises	FAWCETT
Flakeboard Company	FLAKEBOARD
Frobisher Industries	FROB IND
G. Gilks	GILKS
E. Goguen	GOGUEN
Goldsmith Lumber	GOLDSMITH
Walter Hadley	HADLEY
Hainesville Lumber	HAINESVILL
D. Hay and Son	HAY
Hicks Bros.	HICKS
C. Hopper	HOPPER
Jamer Bros.	JAMER BROS
Kedgwick Lumber	KED LUMBER
Kingston, A.	KINGSTON

DESTINATION CODE NAMES

Sublicensees (cont'd)

	1 2 3 4 5 6 7 8 9 10
Herbert Knowles	K N O W L E S
Lattes Balmoral	L A T T E S B A L
Lakeburn Lumber	L A K E B U R N
Lebel, Deniso	L E B E L
Leger Firewood	L E G E R
Levesque, R.	L E V E S Q U E
S & M Little	S M L I T T L E
F. Maillet	M A I L L E T
Matchett	M A T C H E T T
Moulin McGraw	M C G R A W
McLeod and Lamb	M C L E O D L A M
Moore's Lumber	M O O R E
J.S. Murray	M U R R A Y
North American Forest Products	N A F P
Newcastle Lumber	N E W C L U M
New Maryland Lumber	N M A R Y L A D
Scierie Cormier	C O R M I E R
G. Price	P R I C E
A. Pineau	P I N E A U
Quisbis Lumber	Q U I S B I S
J. Robar	R O B A R
G. Roy	R O Y
Russell and Swim	R & S
R.F. Sadler	S A D L E R
Sheila Lumber	S H E I L A
St. Stephen Fence	S T S T E P H N
J. Sparkes & Sons	S P A R K E S
St. Anthony Lathing	S T A N T H
Stevett-Wade	S T E V E T W A D

DESTINATION CODE NAMES

Other Destinations

	1 2 3 4 5 6 7 8 9 10
St. Paul Lumber	S T P A U L
St. Ignace	S T I G N A C E
Sturgeon, H.	S T U R G E O N
S. Theriault	S A R T O T H E R
O. Thibeault	O T H I B E A U L T
Northern Timber	N O R T H T I M B
W. Tompkins	T O M P K I N S
Underhill Forest Products	U N D E R H I L L
Veneer Products	V E N P R O D
Western Cedar Fence	W E S T E R N
M.L. Wilkins	W I L K I N S
Local Sales	L O C A L S A L E
Export (P.Q., Me., Other)	E X P O R T
Left Standing On Block	S T A N D I N G
Harvested Wood Still In Bush	B U S H

APPENDIX 12

SUMMARY OF PROPOSED HARVEST

The Licensee shall submit a summary of the estimated harvest volumes for each year one of the Operating Plan on the attached table "Summary of Proposed Harvest".

This summary shall be based on information reported in **Appendix 11** for each year one harvest block.

Summary of estimated harvest shall be reported by product and destination.

APPENDIX 12
SUMMARY OF PROPOSED HARVEST

LICENSE _____ AMENDMENT NO. _____ DATE _____

PRODUCT	DESTINATION (MILL NAME)
SOFTWOOD VENEER	
SPRUCE & FIR SAWLOGS	
SPRUCE & FIR STUDWOOD	
JACK PINE SAWLOGS	
JACK PINE STUDWOOD	
WHITE PINE VENEER	
WHITE PINE SAWLOGS	
CEDAR SAWLOGS	
HEMLOCK SAWLOGS	
SPRUCE & FIR PULPWOOD	
JACK PINE PULPWOOD	
WHITE PINE PULPWOOD	
CEDAR PULPWOOD	
HEMLOCK PULPWOOD	
HARDWOOD VENEER	
HARDWOOD SAWLOGS	
HARDWOOD PULPWOOD	
HARDWOOD FUELWOOD	
POPLAR VENEER	
POPLAR SAWLOGS	
POPLAR PULPWOOD	

NOTE : PRODUCTS SHALL BE AS LISTED IN APPENDIX 9 "PRODUCT LIST" ; ALL VOLUME IN M^3

APPENDIX 13
HARVESTING REQUIREMENTS

Harvesting

1. All surveyed License boundary lines shall remain undisturbed and free of brush.

2. Mining claim posts and survey monuments of any kinds shall not be disturbed.

3. No slash or debris within a harvesting block shall be piled in such a manner that causes either a fire hazard or impedes natural or artificial reforestation. Excessive slash created at roadside as a result of full tree harvesting should be windrowed and burned or disposed of in some other manner acceptable to the RRM.

4. All vehicles removing primary forest products from Crown Lands shall have such primary forest products identified in a manner acceptable to the RRM.

5. All merchantable primary forest products shall be removed from areas to be cleared for construction of roads, quarry sites, landings, industrial campsites, mine sites, utility lines, etc.

6. The rights-of-way of **Provincial Highways** and the travelling surfaces of **forest roads** shall not be used as landing areas. If the rights-of-way of forest roads are to be used as landing areas, they shall be restored to their original standard following the completion of the hauling.

7. All allocated products harvested during any one operating year shall be removed from the block and transported to a wood processing facility within the first six months of the following operating year.

8. Although the maximum size of clearcuts will normally be limited to 125 ha, the RRM may authorize larger cuts depending upon the degree of damaged wood and stand maturity. Based on site-specific and general wildlife habitat considerations, natural boundary features and the proximity to adjacent clearcuts the RRM may require smaller cuts.

The size of harvest block left between cutover areas shall be large enough to be economically harvested.

9. Vehicles shall not travel through or within natural watercourses. Wheeled or tracked harvesting equipment will not be permitted to track within 15 m of the bank of any natural watercourse whose channel is 0.5 m or wider.

Whenever watercourse crossings are necessary, culverts shall be used and constructed in accordance with **Appendix 10** except for temporary crossings, ice bridges, etc. as approved by the RRM.

10. The usual minimum buffer strip width on any watercourse whose channel is 0.5 m in width or wider shall be 15 m of standing timber and/or other vegetation. However, the minimum buffer strip width may be adjusted on a site-specific basis based on a consideration of the following factors:

a) steep slopes
b) unstable soils
c) fish spawning and nursery areas
d) deer wintering areas
e) moose calving areas
f) mineral licks
g) maintenance of wildlife travel corridors
h) percent of watershed harvested
i) aesthetics and recreation use
j) other identified fish and wildlife habitat needs.
k) stand maturity

Harvest operations may take place within a watercourse buffer strip under conditions specified by the RRM.

11. All harvesting blocks must be flagged on the ground by the Licensee prior to harvesting in accordance with the area outlined on the harvest block map in the approved Operating Plan.

12. No tops, slash, debris or primary forest product from a harvesting operation shall be allowed to enter any watercourse.

13. Each harvest block must be posted with a sign indicating the harvest block number.

14. No primary forest product shall be piled down within 15 m of a watercourse.

15. No garbage, oil, oil containers, filters or other refuse shall be deposited on the harvest block or associated access roads by those involved in the harvesting operations.

16. Unless Sublicensee harvesting operations are being supervised by the Licensee, DNR staff will be responsible for cut inspections on harvest operations conducted by the Sublicensee, ensuring that utilization standards are observed, that block boundaries are respected and that all necessary work permits have been acquired.

APPENDIX 14

MERCHANTABLE WASTE VOLUME DETERMINATION

1. Merchantable waste volumes shall be reported by the Licensee at the request of the RRM for any Licensee harvesting block or portion thereof.

2. Waste sampling shall be performed at an intensity of 1.25%.

3. Merchantable waste shall be as defined in the Timber Regulations under the Crown Lands and Forests Act.

4. Penalty may be assessed when combined hardwood and softwood merchantable waste volumes exceed an average of 3.0 m^3/ha or 3% (whichever is lowest) of the volume harvested by the operator.

5. Merchantable waste shall be determined by the following procedure:
   (a) Define the block on a 1:12 500 scale map and determine size (ha) of the block.
   (b) Indicate location of waste plots on map. Plots shall be uniformly distributed over the entire block or portion thereof by establishing parallel lines at 200 m spacings and locating plots along these lines at 200 m intervals which will provide a sample intensity of 1.25%.
   (c) Locate plots in the block as indicated on a 1:12 500 scale map. Plots shall be either circular with a radius of 12.62 m or rectangular 10.0 m wide and 50.0 m long. The center point or corners of all plots shall be marked to allow DNR to check waste sampling.
   (d) Waste shall be considered within the plot when the sawn surface or butt end of a tree, bolt, log or top is within the plot. A standing tree or stump shall be considered within the plot when more than one-half of the diameter of the tree or stump is within the plot.

(e) Waste in tops and bolts shall be tallied by mid-diameter in cm of 2.44 m bolts.
Waste in trees shall be tallied by D.B.H. in 2 cm size classes.
Waste in cut or broken pieces shall be tallied by mid-diameter in 2 cm size classes and 0.50 m length classes.
Waste in skids and logs shall be tallied by small top diameter in 2 cm size classes and 0.20 m length classes. Skids or logs longer than 5.7 m shall be tallied as two logs.
Waste in high stumps shall be tallied by number.

(f) Determine merchantable waste per ha by multiplying the tallied waste volume by 20.0 and dividing by the number of plots tallied.

6. All merchantable material on roads and landings must be utilized regardless of quantity.
Note: Merchantable waste volume determination will be reported on a form supplied by DNR.

APPENDIX 15

PROPOSED SILVICULTURE TREATMENT SCHEDULE

DISTRICT _____ AMENDMENT _____ CROWN _____

TYPE OF TREATMENT _____ DATE _____ FREEHOLD _____
(e.g. Planting, Precommercial Thinning, Plantation Tending, etc.)

SILVICULTURE TREATMENT NUMBER	HARVEST BLOCK NO.	MAP NUMBER	PHOTO NUMBER (MOST RECENT)	ORIGINAL FOREST UNIT	NEW FOREST UNIT	PREVIOUS TREATMENT AND YEAR	BLOCK AREA	BASIC (B) OR LICENSEE (L)	ACTIVITY DESCRIPTION *

* PLANTATION - species and number of trees required; THINNING - density ; HERBICIDE - plantation, partial thinning (specify year of final thinning), natural release or site preparation

APPENDIX 16

REQUIREMENTS FOR MAINTAINING DEER WINTER SHELTER

INTRODUCTION

A deer wintering area (DWA) is considered to be an area currently used by deer during winter and also includes adjacent stands that have a potential for providing shelter and food on a long-term (50 plus years) basis. DWA's are not "reserves" from which no wood products are to be extracted. However, the dominant use in those areas is provision of deer winter habitat and secondary uses, such as extraction of wood, will be permitted when they are compatible with habitat goals. In other words, harvesting operations will be designated and carried out to create desired stand conditions to maintain or improve deer wintering habitat, with wood products as a secondary benefit. License wood supply analyses included deer wintering areas as part of a 15 percent inaccessible reserve. Wood volume removed from DWA's is, therefore, not part of the calculated sustainable harvest.

Harvesting in and around DWA's is not always attractive from an industrial or biological point of view. Such operations usually entail higher costs and can have deleterious impacts on deer. A passive protectionist policy, however, does not serve the needs of forest or wildlife managers. DWA's are often associated with high quality wood, something presently in short supply. Component stands are subject to the same dynamic forces as other stands; they will age and their habitat qualities will change.

Positive and active strategies are a prerequisite to a successful DWA management program. Increased benefits can be realized by industry; by making more high quality wood available, and wildlife managers, by maintaining wintering habitat over the long-term.

The crown has a legislated mandate for management of habitat for the maintenance of wildlife populations. Licensees are responsible for planning and executing wildlife habitat management activities. The following is provided for the Licensee's benefit in order to aid their development of the wildlife habitat management sections of Management and Operating Plans.

STRATEGY

GOALS

Close cooperation and a sharing of major responsibilities is required between the Department of Natural Resources and Energy and the Licensee. Management goals include:

1. maintaining and improving DWA habitat;

2. recognition of DWA's primarily as wildlife habitat and only secondarily as a source of wood;

3. utilization of commercial forest cutting as a management technique with primary benefits to deer and secondary benefits for the forest industry;

4. establishment of cut areas which allow production of browse as well as regenerate quickly to reestablish softwood cover.

The DWA management situation is complicated by the uniqueness of all DWA's (making hard and fast rules governing their management is undesirable) and the logistics of developing and carrying out specific plans for up to hundreds DWA's, as they now exist in terms of numbers, quality, distribution and area are required to maintain deer numbers. The management goal is maintenance of the present complex or equivalent of DWA's.

MAPPING

Locations and boundaries of known DWA's on Crown land will be provided by DNR.

Only DWA's of at least 25 hectares will be mapped. Riparian strips and uncut blocks will accommodate smaller areas. Approximate locations will be provided through aerial surveys and ground checks by DNR staff will be done to delineate boundaries. Boundaries will include adjacent forest stands (to those currently utilized) which offer suitable shelter and age qualities to replace deteriorating shelter stands. A maximum of ten percent of Crown land will be designated as DWA's. Maps will be updated as data becomes available.

DEER WINTERING AREA MANAGEMENT

All identified DWA's are to be protected and/or managed. Criteria on which to make decisions regarding wood harvest are based on considerations of conditions within and surrounding DWA's.

Substantial removal of shelter stands will only be permitted when adjacent areas, which have not been traditionally used, become utilized by deer. Shelter stands within DWA's are defined as softwood and softwood/hardwood stands (greater than 75% softwood) of ten meters or more in height and Crown closures of 50 to 70 percent. Cut permission is dependent on the satisfaction of the RRM that the long-term capability of the wintering area to support deer is not compromised.

Consideration in this evaluation include evidence of increased and successful wintering of deer in "new" shelter areas, potential fragmentation of shelter stands, quality of shelter stands (both traditional and potential) and the location of potential shelter stands (efforts to "move" shelter components of wintering areas should be up and down rather then across watersheds in accordance with deer movement patterns).

Stands within a DWA qualify for harvest when:

1. Spruce is the major softwood component and 50 percent of the spruce/fir volume is overmature.
2. Balsam fir is the major softwood component and 50 percent of the fir/spruce volume is overmature.

The following conditions apply to cutting in deer wintering areas:

1. Maintain 60 to 70 percent of the DWA in conifer stands of 10 m or more in height and with Crown closures of 50 to 70 percent.
2. Stands which are overmature, diseased, damaged by insects, or least used by deer will receive priority for cutting.

3. Individual openings should not exceed 8-10 ha and should be uniformly distributed throughout the stand. Cuts should be in irregular patches or strips wherever possible. Cedar and hemlock should be protected. If the wintering area is narrow, care must be taken not to fragment it.
4. Areas left uncut should remain attached to adjacent shelter areas by travel lanes 30 to 60 m wide. Shelter trees should never be left as isolated patches.
5. Selective cutting to remove the larger trees from riparian strips may be used when feasible.
6. Cutting in DWA's should be timed for the fall and winter.
7. Damage to residual timber must be minimized. No road right-of-way within a DWA will exceed 15 m in width.

Further considerations for planning cuts in deer wintering areas include cutting history and topography. The above guidelines stipulate that 60 to 70 percent of the wintering area is to be maintained in shelter stands. Past cutting practices may have already reduced the size of a DWA to a great extent or could have eliminated nearby shelter areas. In the event of little or no potential adjacent shelter and a history of reduction of local shelter areas, further reduction of shelter areas may not be acceptable.

The general topographic layout of the DWA has to be considered in the evaluation of an Operating Plan. Planned cuts which open up the area in a way that will funnel prevailing winds or facilitate downslope air mass movement (creating frost pockets) into shelter stands will reduce the shelter qualities in a DWA.

Strip cuts should be oriented perpendicular to prevailing winds. Protective uncut blocks create wind breaks. When areas are not opened up too much and adequate shelter areas are interspersed with browse producing areas (cutovers), an ideal situation is created as far as deer winter habitat is concerned. The proposed arrangement of cuts is ultimately the most important factor both operationally and biologically. Great care must be taken to ensure efficient and biologically sound operations. Licensees are required to work in close cooperation with DNR biologists in habitat management planning.

DWA operations will include those operations occurring in immediately adjacent stands to DWA boundaries. DWA's are not to be left as isolated "islands" and appropriate travel lanes are to be maintained between the DWA's and nearby uncut stands. This will often be accommodated by maintenance of riparian strips of 30 m to 60 m in width.

APPENDIX 17

SPECIFICATIONS FOR NURSERY STOCK

1. Stock must be healthy.

2. Container Stock (eg. paperpot 408, jiffy 70, jiffy 140, Can Am 3)

Parameter	All Spruce			All Pine Larch, Cedar		
	min.	avg.	max.	min.	ave.	max.
Total height (cm)	(10)	15	(30)	(10)	15	(25)
Root Collar dia. (mm)	(1.25)	1.5	(3.0)	(1.0)	1.5	(2.5)
Total Dryweight (g)	(.5)	1.0	(2.75)	(0.5)	1.0	(2.5)
Shoot: Root Ratio	(2)	5	(8)	(2)	4	(6)

DNR's objective is for seedlings to achieve the average specifications by the scheduled dates on the Plantations Trees Shipping Plan. This plan is made available to the Licensees in December prior to the next year's planting season.

DNR maintains detailed records of crop history and morphological and physiological data for individual crops and this will be made available to Licensees upon request.

3. Bareroot Stock - Specifications will be negotiated with individual Licensees(s) planting this type of stock.

4. A Licensee representative will be required to sign, prior to shipment, a "batch" approval form for specific stock that they have been allocated indicating that the seedlings in the crop are of an acceptable quality and standard. Licensees will be informed by DNR when a specific batch is of a special or research nature.

5. Although seedlings will generally be batched to individual Licensees, the Provincial nurseries will reallocate batches during the planting season to ensure wherever necessary that seedlings do not significantly surpass specified stock parameters. Where height and top/root ratio parameters are being exceeded the Licensee has the option to accept these seedlings or request that they be sheared at an appropriate time during the growing period.

6. Individual loads should be ordered from the specific nursery by giving the eleven digit silviculture treatment number if known at the time of ordering, i.e. the planting block number. If unknown it should be marked or corrected on the nursery's copy of the shipping slip upon delivery, or the nursery should be informed of the silviculture number(s) after planting an individual load.

7. Upon delivery, the Licensee representative on the planting site must sign a receiving slip for each load of seedlings. If part or all of a load is rejected, reasons must be stated with all of the faulty seedlings being returned by the same truck. Neither foremen nor planters are authorized to dump quantities of seedlings. Receiving slips will be produced in a booklet form with copies for the Licensee and DNR. These slips will also indicate a crop identification number which should be recorded for each plantation on the certification form for silviculture reimbursement.

8. In order to facilitate deliveries, prior to the planting season Licensees must forward a map at a scale of 1:125 000 to each nursery from which they have been allocated stock. The map should indicate planting areas by silviculture number.

9. Licensees are responsible for stockpiling empty seedling trays and ensuring that they are being returned on DNR trucks during the planting season.

10. These specifications for nursery stock are interim and will be revised pending research trials required to correlate seedling quality with plantation performance.

APPENDIX 18
SUBLICENSEE AGREEMENTS

LICENSE _____ DATE _____

SUBLICENSE	PRODUCT	NEGOTIATED OPERATING PLAN VOLUME	ACTUAL VOLUME HARVESTED	ACTUAL VOLUME PURCHASED	NEGOTIATION COMMENCEMENT DATE	AGREEMENT DATE	COMMENTS

NOTE: PRODUCTS SHALL BE AS LISTED IN APPENDIX 9, ALL VOLUMES IN m^3

APPENDIX 19

CRITERIA FOR AERIAL PHOTOGRAPHS OF UPDATE AREAS

General:

1. All update photos must be submitted at a scale of 1:12 500.
2. Black and white panchromatic film must be used.
3. Photos will be printed in 22 x 22 cm format.
4. Aerial camera must have 70 mm or larger objective lens.
5. Location of all photo centres must be accurately located on a 1:125 000 index map.
6. All photographs will be annotated by the Licensee to include:
   a) Harvest block number or silviculture number;
   b) Accurate delineation of the entire cut boundary; if more than one harvest and/or silviculture block appears on a photograph, each block must be clearly numbered (12 digits);
   c) A photo number in the southwest corner containing, in the following order, license number (2 digits), year of photography (2 digits), flight line number (3 digits - optional), and a sequential number (3 digits); (ex. 0886536001 or 0886001);
   d) A true north arrow;
   e) A 1:12 500 map number; and
   f) The classification of all new forest and/or logging roads.

Delineation/Stratification:

7. Update photography must be provided for all harvest blocks, forest and logging road right-of-ways and silviculturally treated areas.

8. Only the update area within the effective area or centre of the photograph is acceptable; therefore several photos may be required to adequately cover large update areas. The effective area of a photo is the approximate 206 ha in the centre of the photo.

9. For partial cuts (> 35 m^3/ha residual volume) the Licensee must provide an estimate of the volume per hectare of the residual stand and its species composition based on the forest development survey species composition criteria. All of this information must be listed on the back of the photograph.

Quality:

10. Aerial photographs of update areas must be of sufficient quality to permit accurate transfer of areas from the photograph to 1:12 500 GIS maps; i.e. specific land features must be clearly identifiable on the photograph.

Although not specific criteria the following points are suggested to ensure quality photography:

1. Aerial photography should be obtained only when lighting and weather conditions are such that acceptable negatives can be produced. Skies should be clear with a minimum of atmospheric haze.

2. Photography should not be taken during the midday period when the solar altitude is greater than 59 degrees. This causes "hot spots" on the photograph which distorts land features. The solar altitude should be between 30 and 59 degrees.

3. All photography should be free from blemishes such as smoke, cloud, cloud shadow, fuzziness, distortion (tilt-camera movement) and excessive dark or light tones (contrast).

APPENDIX 20

ANNUAL REPORT OF SILVICULTURE TREATMENTS

The Licensee shall report all silviculture activities which were undertaken in the past operating year as shown on the "Annual Report of Silviculture Treatments" form, regardless of whether the silviculture activity was accepted for reimbursement.

The Licensee shall report the following information:

1. Map # means the 1:12 500 FDS map (ONLY) (4 digit number).
2. The Silviculture Treatment Number must include section numbers to cover differences in crop identification numbers (Crop ID #'s) for plantations and pretreatment density for thinning. These must be reported separately, i.e. a different row in the table for each silviculture treatment number and section.
3. Separate sheet(s) must be prepared for;
    (a) planting
    (b) thinning
    (c) plantation cleaning
    (d) herbicide
    (e) site preparation
    (f) experimental projects
    (g) miscellaneous
4. With respect to type of herbicide treatment specify: plantation release, natural release, partial thinning or site preparation.
5. The following information will be required for silvicultural treatments undertaken within site-specific wildlife habitats: the habitat type or DWA number.

APPENDIX 20

ANNUAL REPORT OF SILVICULTURE TREATMENTS

GIS MAP #	HARVEST BLOCK #	TYPE & YEAR OF SITE PREPARATION OR TYPE OF HERB. TREATMENT	CROP ID # *	PLANTING DENSITY	THINNING DENSITY		AREA (HA)	DATE START / FINISH (MONTH / DAY)
					BEFORE TREATMENT	AFTER TREATMENT		

* CROP IDENTIFICATION NUMBER

APPENDIX 21

CRITERIA FOR HERBICIDE AREA SELECTION

Areas that do not meet the conditions as specified in the permit issued by the Department of Environment shall be omitted.

Unless otherwise approved by the RRM, the following criteria shall apply to areas to be treated with herbicides.

1.* **Softwood Plantations - First Application**

a) Softwood stocking (planted and natural) must be > 75%,

b) Plantations must be established for at least 12 months,

c) Hardwood and woody brush and/or herbaceous weeds must occupy 80% of site,

d) 60% of the planted softwood crop must be overtopped.

2. **Softwood Plantations - Second Application**

a) Plantation is less than 7 years old

b) More than 25% of the softwood stocking is overtopped with hardwood or shrub species whose density is shown to be at a level where manual cleaning costs would be more expensive than a herbicide treatment.

*NOTE: If pin cherry is the only dominant competing species, then herbicide treatment may be refused until a time when it can be documented that 25% of the softwood stocking exhibit growth interference.

3.* **Naturally Regenerated Cutovers**

a) No significant volume of residual commercial hardwoods, i.e. more than 25 m^3/ha.

b) No significant amount of tolerant commercial hardwood basal area, i.e. > 16 m^2/ha.

c) Softwood stocking (based on stocked plots) must be > 75%

d) (i) more than 40% of softwood must be experiencing growth interference** from overtopping hardwood and brush competition.

OR

(ii) More than 75% of stocked softwood must be overtopped by hardwood and brush species.

4. **Experimental** (relatively small areas as per design).

** Growth interference refers to reduced leader height growth, abundance of shade foliage, damage to leader from "whipping" or other physical damage from adjacent vegetation. Shade foliage is characterized by fine, short needles and branches and perhaps light discoloration. Both reduced leader length and shade tolerant foliage are readily apparent by observation and comparison of a few "competition free" seedlings in the plantation or cutover.

5. **Special Situations**:

Criteria:

a. Site preparation where the following is specified or occurs: planting larch, hardwood planting, fill planting, scarified areas where planting unavoidably delayed, dense aspen regeneration, wild fire, etc.

b. Specific objectives with supporting data required for each proposal.

GLOSSARY

abutment - that part of a bridge structure located at the watercourse bank which supports the bridge span.

aerial photography - vertical aerial photography as outlined in **Appendix 19** or an alternative acceptable to DNR.

borrow pit - excavated material along the road right-of-way or from precut pits outside the road right-of-way to be used in the subgrade or grade of the road.

buffer strip - a natural boundary of standing timber and/or other vegetation left between watercourses and road right-of-ways or harvest block boundaries.

bullpen - a flattened soil covered, bulldozed ramp of grubbed material located in natural or precut openings adjacent to the road right-of-way.

cofferdam - a temporary enclosure built in a watercourse of nonerodable material to separate work areas from the watercourse.

easement - a legal transfer of access rights that the owner conveys to a user so that the user can travel without hindrance or threat of closure across a specified section of the owner's land.

fill planting - planting method to supplement existing Acceptable Natural Softwood Regeneration in order to raise the stocking level of planted plus natural seedlings to a minimum of 90%. (It is recognized that it may be necessary to space the existing naturally stocked areas at a later date in order to adjust the resulting density.)

forest road - a road on Crown Lands to the fullest extent of the right-of-way of such road and includes the bridges thereon but does not include a highway as defined in the Highway Act, or a logging road.

groin - built up mound of soil placed on the downhill side of the inlet and outlet of a culvert to divert surface drainage through the pipe and directed away from the road.

grubbing - removing and disposing of all stumps, roots, unmerchantable trees and overburden material from the road right-of-way.

Logging road - a temporary road within a timber harvesting area on Crown Lands to the fullest extent of the right-of-way, built solely for the extraction of timber and includes landings and other works associated with the harvesting operation.

Quarry Permit - a permit required to remove sand or gravel or other material under the Quarriable Substances Act.

right-of-way - the width and length of cleared area along the road alignment which contains the road bed, ditches, side slopes and back slopes.

rip-rap - a layer of durable quarried or field rock placed at both the inlet and outlet of culverts or around bridge abutments to stabilize fill slopes around the drainage structure.

RRM - The Regional Resource Manager(s) of the Department of Natural Resources and Energy.

shear wall - a wall constructed as part of a bridge abutment either at right or acute angles to the face of the abutment to stabilize the fill of the road approach to the bridge.

site-specific

wildlife habitat - includes; deer wintering areas, moose wintering areas, moose calving areas, waterfowl production areas, raptor nest sites, mineral licks, wildlife travel corridors, watercourse buffer strips.

skewed - angled or placed at an angle not perpendicular to a straight line.

superstructure - all that part of the bridge structure above the bearings of single and continuous spans. Includes stringers, deck, running surface, guardrail, etc.

Watercourse - "Natural watercourse" means any natural drainage feature which has a discernible channel.

The F.M.M. identifies two categories of natural watercourses with respect to provisions for fish habitat and water quality protection.

A. those watercourses with a channel width of > 0.5 meters and greater

B. those watercourses with a channel width of < 0.5 meters.

Commentary on small watercourses:

All natural watercourses contribute to, and hence influence, downstream water quality and fish habitat. Consequently the Department recognizes the need to safeguard even small watercourses (those < 0.5 meters channel width) in the course of road construction and other forest operations. The principal concern with regard to these small watercourses is one of sediment transport; although downstream temperature influence may also be a concern where the watercourse in question is a groundwater source (spring).

Subsequently, the two primary provisions to be considered for culverts being installed in natural watercourses with a channel width of < 0.5 meters are stabilization and grubbing. As for such watercourses occurring within a harvest block; while they are not required to be buffered it is important that they be identified and respected with regard to machine travel.

windrowing - bulldozing stumps, roots, unmerchantable trees and overburden material into a long low ridge parallel to the roadway and inside the road right-of-way.